Interaction, Noticing and Second Language Acquisition:

An Examination of Learners' Noticing of Recasts in Task-based Interaction.

by

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Declaration

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Abstract

This dissertation concerns learners' perception and use of implicit feedback in the context of interaction. Recent studies have provided empirical evidence for the positive effects of interaction on second language development, however there is little understanding of how learners process and internalise second language data.

In seeking to understand how interaction promotes interlanguage development, noticing has been posited as a crucial factor. If second language (L2) input is to be used by the learner it must be noticed. Interaction is argued to promote noticing of L2 form in a very specific context, that is, when learners perceive a mismatch between the L2 form and their own interlanguage grammar.

The foci of this dissertation are, in the context of oral interaction:

1. to operationalise noticing;
2. to examine both whether learners notice recasts of their non-target-like utterances and what factors constrain noticing of recasts;
3. to examine whether noticing of recasts can lead to interlanguage restructuring.

Whereas previous SLA research has used retrospective methods for accessing noticing of oral input, the current study sought to examine noticing in the context of task-based interaction at the same time that feedback was being given.

The study specifically examined what learners noticed about morphosyntactic modifications made to their production of question forms through recasts. In five sessions of dyadic interaction, 33 ESL learners received recasts of their non-target-like questions from their native speaker interlocutors. Noticing was defined as: "detection with awareness and rehearsal in short term memory" (Robinson, 1995, p. 318), and operationalised as the learner's ability to immediately recall the

recast in response to an unexpected sound cue. Subsequent use of recasts was measured through analysis of learners' interlanguage production over six weeks.

Research questions addressed (a) constraints on noticing of recasts and (b) use of recasts. The results suggest that recasts were noticed by learners, supporting the claim that interactional modifications may draw learners' attention to anomalies between their interlanguage production and target language input. However, recasts were not always noticed, constrained both by the limitations of short-term memory capacity and processing biases of the learner. The results also support the claim that noticing may lead to interlanguage restructuring, under certain conditions. Where data matched the processing biases of the learner and where there were repeated opportunities to hear and to produce interlanguage forms, learners noticed and later incorporated recasts of their non-target-like production.

This study contributes to both theory and practice within second language acquisition research. It proposes a potential means of measuring noticing of recasts in the context of interaction and contributes to a further understanding of second language acquisition processes.

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For my parents:

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Introduction

CHAPTER 1

1.1 The effects of interaction on second language development

When non-native-speakers (NNS) are participants in meaningful interaction, the nature of that interaction changes in ways that may be facilitative of second language acquisition (SLA). Potential and actual communication difficulties may result in modifications to language and to the structure of the discourse itself. Language may be rephrased, repeated and segmented in ways that promote mutual comprehension and serve to highlight form-meaning relationships for the NNS.

In the following exchange, a native speaker (NS) and a NNS, whose first language (L1) is Korean, are discussing a picture together while working on a story-completion task.

Example 1

1.	NS	yes this is for the dinner for tonight
2.	NNS	make bread?
3.	NS	no this is this is the meat
4.	NNS	yeah
5.	NS	this is all meat
6.	NNS	all meat?
7.	NS	yeah a great big piece of meat
8.	NNS	(...) I I I th= I looks ah it it looks bread?
9.	NS	it looks like bread [laughs]
10.	NNS	yeah looks like bread
11.	NS	yeah it does but it's actually meat it's a bi:g piece of meat maybe lamb
12.	NNS	lamb?
13.	NS	mm you know from a sheep?
14.	NNS	yeah I see but in in my eyes it looks bread

This short extract[1] provides an illustration of how language may be repeated, expanded and rephrased in NS-NNS interaction. The NNS has opportunities to clarify and check meaning (line 6, 12), to repeat novel structures and words (line 10), to receive target-like alternatives to his non-target-like utterances (line 9) and to use that feedback in subsequent production (line 14). In this case some of those opportunities were taken up (line 12) and others were not (line 14).

It has been hypothesised that such linguistic and conversational modifications occurring in interaction promote acquisition because they assist comprehensibility, facilitate communication and increase saliency of forms in the L2 (Gass, 1997; Long, 1981; 1983a; 1997; Pica, 1992b; 1994; Swain, 1985; 1995). As will be seen in Chapter 2, empirical research largely supports these claims (Ellis, Tanaka, & Yamazaki, 1994; Gass & Varonis, 1994; Loschky, 1994; Mackey, 1995; in press; Mackey & Philp, 1998; Pica, 1994; Pica, Holliday, Lewis, & Morgenthaler, 1989; Pica, Young, & Doughty, 1987).

This study is concerned with the selective attention of second language learners during oral interaction: specifically, with learners' perception and use of modifications made to their production by native speakers.

1.1.1 The role of noticing

In an updated version of the *interactionist hypothesis*, (Long, 1981; 1983a; 1983b; 1985) Long (1997) claims that:

> negotiation for meaning, and especially negotiation work that facilitates interactional adjustments by the NS or more competent learner, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output, in meaningful ways (pp. 451-452).

[1] Data from current study

As noted by Long, the selective attention of the learner is of fundamental importance in the connection between conversational interaction and acquisition (see also Ellis, 1991; Gass, 1991; Gass & Varonis, 1994; Long, 1997; Schmidt, 1990; 1994; Schmidt & Frota, 1986). Schmidt (1990) and Gass (1991) claim that "nothing in the target language is available for intake into a language learner's existing system unless it is consciously noticed (Gass, 1991 p. 136)". In other words, it is only what the learner *notices* about the input that holds potential for learning. This is the basic assumption underlying the work presented here.

The potential of interaction lies both in timing and the context: Interactional modifications, such as those seen in Example 1, draw the attention of the learner at the point when the learner's production or representation of the second language (L2) is at odds with the input (Faerch & Kasper, 1986; Ellis, 1991; Gass, 1990; Gass & Varonis, 1994; Long, 1997; Pica, 1992b; 1994). Gass and Varonis (1994), for example, claim that:

> [negotiations] crucially focus the learner's attention on the parts of the discourse that are problematic, either from a productive or a receptive point of view. Attention in turn is what allows learners to notice a gap between what they produce/know and what is produced by speakers of the L2. The perception of a gap or mismatch may lead to grammar restructuring. (p. 299)

Three hypotheses are advanced here. First, interactional modifications arising from communication difficulties draw learners' attention to form. Secondly, learners' attention is drawn in particular to anomalies between what the learners know and produce and what they perceive in the TL input. Thirdly, such noticing leads to IL change.

1.2 The purpose of the research

It follows that in order to substantiate the theoretical understanding of how interaction facilitates second language development, evidence that learners in fact do notice interactional modifications is essential. While some recent studies have investigated the nature of input processing and learners' noticing of form, these have been with regard to reading and written tasks or as a result of instruction, and these are described in Chapter 2 (Fotos, 1993; Jourdenai, Ota, Stauffer, Boyson, & Doughty, 1995; Leow, 1997; 1998a; Robinson, 1996a; Schachter, Rounds, Wright, Smith, & Magoto, 1996; Slimani, 1989; VanPatten, 1990; VanPatten & Cadierno, 1993). However, there is a paucity of work directly related to learners' noticing of forms as a result of linguistic and conversational modifications in oral interaction. Yet such research is crucial to the interactionist hypothesis. In part this lack of research is due to the difficulty of operationalising noticing, which concerns internal processes, for the context of interaction, which engages both the aural and oral skills of the learner. To date, retrospective means have been those used for such a task.

The results of this study hold both theoretical and research significance in the field of second language acquisition (SLA). A major innovation of this study is to operationalise noticing in such a way that *on-line* noticing of input to the learner is accessed. The second important contribution of this study is that is tests the claim that learners notice mismatches between the target-language (TL) data they receive and their own interlanguage representations of that data. As learners engage in interaction with others, what do they perceive and record in short-term memory? What constrains noticing? What factors affect learners' noticing the gap between the interlanguage (IL) and the TL input?

The foci of the study are three-fold and are specific to the context of oral interaction. They are:

1. to operationalise noticing;

2. to examine whether implicit feedback on learners' non-target-like utterances is noticed and whether noticing is constrained by certain factors;
3. to examine whether noticing of implicit feedback can lead to interlanguage restructuring.

While the research may have implications for the classroom, it primarily addresses theoretical work in SLA research and seeks to contribute to an empirical understanding of the processes behind SLA. The study centers upon a key issue in SLA research, as identified above; that is, the role of *noticing* in second language development.

It is not the purpose of this study to deal with the complex issues of implicit and explicit learning, and the possibility of unconscious learning, nor of incidental and instructed language learning, but rather to test the claims made by Gass and Varonis (1994) as outlined above. Noticing is examined in a single context, that of NS-NNS task-based interaction, and with reference to a specific type of interactional modification, that is, recasts. The study is further limited to one level of noticing and to one aspect of second language development, as outlined below.

For the purposes of the research, *noticing* is defined as "detection with awareness and rehearsal in short-term memory" (Robinson, 1995b, p. 318). Whereas previous SLA research has used retrospective methods for accessing noticing of oral input, the current study seeks to examine noticing in the context of task-based interaction at the time that feedback is being given. Noticing is measured through learners' immediate recall of feedback provided during interaction. Although noticing is argued to encompass different levels of awareness, it is only with noticing at the level of immediate cued recall that this study is concerned.

Interactional modifications are given in the form of recasts, that is, target-like reformulations of the learner's non-target-like utterances. Recasts have been identified in previous studies as providing implicit feedback to the learner by the juxtaposition of the correct with the incorrect (Farrar, 1992; Long, Inagaki, & Ortega, 1998; Long, 1997; Lyster, 1998a; Lyster & Ranta, 1997; Mackey & Philp, 1998; Oliver, 1995).

The research design is based on Mackey (1995; in press). Second language development is investigated in terms of morphosyntactic development of question forms in English as a Second Language (ESL). Following Mackey (1995), development is operationalised as increased production of questions at higher stages (see Mackey, 1995; Spada & Lightbown, 1993). Stages of question formation were identified according to the six-stage developmental framework proposed by Pienemann and Johnston (1987).

1.2.1 The research design

The study specifically examines what learners notice about morphosyntactic modifications made to their production of question forms provided through recasts. Over five sessions of NS-NNS dyadic interaction, 33 adult learners of ESL work on picture tasks designed to elicit question forms. In the course of interaction, learners receive recasts of their non-target-like questions from their NS interlocutors. After each recast, an unanticipated sound cue prompts learners to recall what they have heard. Subsequent use of recasts is measured through analysis of learners' interlanguage production over six weeks.

1.3 Organisation of the thesis

Chapter 2 presents a review of theoretical and empirical work concerning, first, the effects of interaction on second language development and secondly, the construct of noticing.

Chapters 3 and 4 explain the research questions and hypotheses and provide a detailed account of the methodology used in the study. A summary of the research questions appears at the end of Chapter 3, while a summary of the analyses used appears at the end of Chapter 4.

Chapters 5 and 6 present, respectively, the quantitative and qualitative results of the study. The fifth chapter deals largely with the data related to learners' noticing of recasts while the sixth chapter focuses on learners' use of recasts in their subsequent interlanguage production. A summary of the results of statistical analyses appears at the end of Chapter 5.

Chapter 7 presents a discussion of the findings, both quantitative and qualitative. The data support the basic hypotheses and Chapter 8 offers a conclusion and draws theoretical and practical implications of the results together with suggestions for future research.

Literature Review

CHAPTER 2

This chapter begins with a review of research on the role of interaction in second language (SL) development from a historical perspective. The first section concludes with the recognition that the potential of interaction for the language learner is mediated by the selective attention of the learner. This is followed by a more detailed consideration of the importance of the learner's production, or *output,* in language learning and, in particular, the relationship between *noticing* and output.

In the second section, characteristics of attention are outlined, and the terms attention, noticing and awareness are described.

The third section describes various ways within second language acquisition (SLA) that noticing has been described and measured. In particular, the problem of investigating noticing in the context of oral language interaction is discussed.

2.1 The role of interaction in SLA

Over the past 30 years in SLA research, interaction has emerged as of prime interest in terms of the role it plays in language acquisition. Findings in SLA research have similarly been noted within the fields of first language acquisition (FLA) and educational psychology, in indicating that interaction provides both a context and a catalyst for learning and change.

First language acquisition research demonstrates ways in which language development is fostered by the participation of the adult or peer (Ninio & Bruner, 1978; Schaffer, 1989; Scollon, 1976; Wells, 1985). Schaffer (1989), for example, in examining joint involvement between the adult and child, suggested that interaction formed the background to the initial

appearance and further development of linguistic forms. In SLA research, Hatch went further in claiming that syntactic structures were actually developed through the act of conversation (Hatch, 1978; 1983; Wagner-Gough & Hatch, 1975). That is, rather than acquisition of syntax preceding use in conversation, learners acquired syntax through the process of collaborative talk with the interlocutor. Hatch argued that this kind of interaction assisted learners in the process of recognising relationships between meaning and form by breaking down language into manageable chunks and, in doing this, provided the scaffold for development. In the following example, as seen in FLA, an adult learner is enabled to communicate in the second language by the collaborative efforts of her interlocutor. The native speaker (NS) expands the learner's minimal utterances where the meaning is clear to her and then pushes the learner to try again where the meaning is unclear. Through this collaborative effort, the few words of the non-native speaker (NNS), (*"window broken"*, *"steal"*, *"dia"*), become a description of the picture in which a thief breaks a window to steal diamonds. The NNS provides the content through key lexical items, the NS refines the pronunciation and elaborates, completing the syntax and morphology for the learner.

Example 1[1] *JapF*

NNS	ah (.) window broken
NS	mm windows broken
NNS	(..) steal ((laughs))
NS	he's stealing something
NNS	tyre? tyre?
NS	tyre?
NNS	dia
NS	diamonds?

[1] Data from Mackey and Philp (1998). All data provided in examples are from the current study and pilot studies collected by Philp (1996) unless otherwise stated. The sex of the NNS in each example is identified by initials (M/F), and the first language by the following abbreviations: Korean (Kor); Thai (Thai); Cantonese (Can); Japanese (Jap); Indonesian (Indo); Russian (Rus). In Example 1, the initials JapF signify that the NNS is a female Japanese learner.

NNS yes

NS he's stealing diamonds

The recognition of the importance of interaction for development, and not simply as a context for reinforcement of teacher-taught items, is critical. Interaction has come to be understood, as in FLA, as a context in which the collaboration between the learner and the interlocutor is a key factor; learners are provided with language in ways that make it more comprehensible and in ways which allow them to express their own meanings. Following Hatch's early assertion of the role of the collaboration of the interlocutor for language learning, seminal work in the 1980s by Long (1981; 1983a; 1983b) described L2 interaction in more detail and showed how the structure of interaction itself met learners' needs for a particular kind of input; that is, input which was both comprehensible and yet pushed learners beyond their current state of knowledge. Given the necessity of comprehension for acquisition (Krashen, 1981; 1985; Long, 1981; 1985), Long (1985) argued that interaction facilitated acquisition in as much as it aided learners' comprehension of unfamiliar input. Further research by others (Gass & Varonis, 1985a; 1985b; Pica, 1991; Pica, Doughty, & Young, 1986; Pica et al., 1987) also demonstrated in what ways a learner's comprehension was aided. These studies concurred with Long's findings that language directed to learners was not only linguistically modified in interaction, but also included conversational modifications. This is demonstrated in Example 2 below. Here the NNS checks his understanding of the NS' direction (line 3). The NS repeats the word and the NNS again checks his understanding (line 5). This is corrected by the NS who provides a paraphrase (line 6), helping the NNS finally to understand the unfamiliar word *"below"*.

Example 2 *CanM*

1. NNS newspaper where the newspaper?
2. NS below the flower
3. NNS next to flower? [NNS seeks confirmation]
4. NS below (NS repeats key word)
5. NNS below means next to [NNS seeks clarification]

6.	NS	beneath under	(NS paraphrases)
7.	NNS	oh under newspaper open	[NNS understands and continues]

2.1.1 Negotiated interaction

This kind of interaction, in which the structure of the interaction itself is modified in response to signals of communication difficulties, has been termed *negotiated interaction.* It is found in both NS-NNS discourse and NNS-NNS discourse, as well as (although to a lesser degree) NS-NS discourse (Gass & Varonis, 1985a; Pica & Doughty, 1985; Pica, Lincoln-Porter, Paninos, & Linnell, 1996). In the effort for mutual comprehension, participants modify language, but they also break up what they say into manageable chunks as learner and interlocutor interrupt the flow of conversation to check comprehension and clarify or confirm the meaning of what is said. Thus language is repeated, rephrased, segmented and modified in response to communication difficulties (Pica, 1992b; 1994).

Negotiated interaction has at least two important consequences for language development. First, it assists the learner to understand input beyond the learner's current level of comprehension, identified (Krashen, 1981; 1985; Long, 1981; 1983a; 1983b; 1985) as essential to acquisition. A number of empirical studies have shown that, when there are communication difficulties, the learner's comprehension is facilitated through interactional modifications (Gass & Varonis, 1994; Long, 1983a; 1983b; Loschky, 1994; Pica, 1991; Pica et al., 1986; 1987).

Secondly, conversational modifications are important in as much as they serve to highlight the relationships in language: the phonology, morphology, syntax and pragmatics of language, and corresponding meanings (Pica, 1992a; 1992b; 1994).

There are, however, limitations in the benefits of such interactional modifications. Sato (1986; 1990) cautioned that not all features of language were made salient through interaction. She carried out a longitudinal

study of the development of past tense reference in the IL development of two Vietnamese brothers learning English. Sato found that a reliance on the interlocutor to supply past tense resulted in a delayed development of morphemes that were non-salient and difficult to pronounce. She suggested that conversational interaction selectively facilitated the acquisition of the linguistic devices that coded various semantic and functional domains in learners' ILs.

Additionally, Long (Larsen-Freeman & Long, 1991; Long, 1997) warned of the insufficiency of comprehensible input in SLA. Exposure to input does not guarantee acquisition. In other words learners do not necessarily take in what they hear. Examples of NNSs immersed in SL contexts, such as 'Wes' (Schmidt, 1983; cited in Larsen-Freeman & Long, 1991) who, in spite of large amounts of comprehensible input, remained at a low level of production, testify to this. Gass (1988), focusing on the learner rather than the input, suggested that it was *comprehended* input that was important, rather than comprehensible input. Others have noted that what was crucial was not comprehension per se but problems in comprehension, as these might drive the learner toward change (Ellis, 1994b; Faerch & Kasper, 1986; White, 1987).

2.1.2 Comprehensible output

Swain (1985) argued that in addition to receiving comprehensible input, learners needed opportunities to produce language for IL development to occur. In understanding L2 input, the learner could rely on L1 knowledge and context to piece together semantic units and might readily "fake" participation in conversation. In production, the learner needs to apply syntactic as well as semantic notions in order to express a proposition. When learners are pushed to go beyond initial linguistic knowledge in the effort to communicate, they grapple with form and have to implement their knowledge of the L2. Swain (1985) suggested that output might draw learners' attention to relationships between form and meaning:

> producing the target language may be the trigger that forces the learner to pay attention to the means of expression needed in order to successfully convey his or her own intended meaning (p.249).

Additionally, researchers have argued that interaction provides opportunities for learners to try out new language forms and structures, to become more adept at using them, and to gain greater control over the features they have already acquired (Ellis, 1984; 1994b; Mackey, 1995; in press; Weinert, 1995). Where practice leads to routinisation in production, this arguably decreases processing load, allowing the learner to process more complex and a greater quantity of material (Gass & Selinker, 1994; Givón, 1989; McLaughlin, 1990; Weinert, 1995). Practice may contribute to an internalisation of knowledge (Bialystok, 1988; Robinson, 1996a; Sharwood Smith, 1993) and an increased systematicity and control over L2 forms. This notion of control is relevant to later discussion of the role of attentional resources.

2.1.3 Summary

In summary, it is argued that linguistic and interactional modifications foster language acquisition in two ways: through input and output. On the one hand, they enable learners to understand input that was formerly puzzling, because they provide L2 data that is repeated, rephrased and segmented: highlighting structural and semantic relationships. On the other hand, interaction which allows modifications, both by the learner and the interlocutor, facilitates development because it provides opportunities for learners to try out their IL and to practice successes, to test out hypotheses about the language and to receive feedback on their attempts (Swain, 1995; Swain & Lapkin, 1995). It is this second aspect of interaction: the way in which output (rather than input) interfaces with development, which is of importance in this study. The different roles output may play in language learning are considered below in more detail.

2.1.4 Roles of output

As noted above, interaction provides learners with opportunities to test out hypotheses and receive feedback on how clear and how target-like their efforts are (Kowal & Swain, 1994; Pica, 1992b; 1994; Swain, 1995). Feedback which is implicit in interaction may be in the form of "negotiation", "recasts", "scaffolds", or a combination of these, as described below. In the following example, the learner and the NS negotiate meaning as the learner strives to express herself and the NS tries to understand her attempts. The NNS finds difficulty in framing her question (line 1), and her interlocutor's initial response is incongruent with what she had intended to say (lines 2, 3). This pushes the learner to try again, this time she is able to produce the key lexical item *"guide"* and the NS provides her with a target-like version of her question (line 4). The NS later supplied the noun *"guide"* in a different construction, as the NNS further refines her meaning (line 7).

Example 3 *CanF*

1. NNS the girl is it what the gui for the for for the boy for the boy [laughs]
2. NS uh huh she likes him too
3. NNS she likes him no ah I mean is (.) the girl is this um ya be be be a guide? guide?
4. NS oh is she a guide?
5. NNS uh huh
6. NS um I dont know what she does maybe she's a student
7. NNS just for the
8. NS oh she'll be a guide for him yeah probably for the weekend yeah

Here and in Example 4 below, the learner's IL output elicits a TL version, that is, a recast, from her interlocutor (line 4). Whereas negotiation sequences may simply point learners to problems in their output (Pica, 1992b), without necessarily providing the solution, the solution may be more clearly provided when recasts result. Researchers have argued that recasts, in which the learner's utterance is linguistically reformulated in a target-like way, provide implicit feedback to the learner by juxtaposition of the correct with the incorrect (Doughty, 1993; Long, 1997; Long, Inagaki & Ortega, 1998; Mackey & Philp, 1998; Oliver, 1995).

Example 4 *KorF*

NNS why why is the why is he why is the son read read the table?

NS why is he ah setting the table?

Scaffolding functions as an expansion and completion of the learners' incomplete utterance. In the moment when learners are struggling with how to express what they want to say, the interlocutor may provide the missing format, as seen in Example 5.

Example 5 *KorF*

NNS does does he uh the hand uh on the hand ah what what

NS what is he carrying?

NNS yeah what he is carry?

Scaffolding is another way in which, through interaction, learners are supported in their efforts to communicate through the TL (Donato, 1994; Ellis et al., 1994; Hatch, 1978; 1983; Philp, 1993). Donato (1994) has argued that this support may "extend current skills and knowledge to higher levels of competence" (p. 40).

In each of the examples provided above, feedback is attuned to the learners' communication needs. When recasts and scaffolds are provided, the solution to their difficulties is juxtaposed with the problem.

The context of this feedback is important in that it is contiguous with the learner's own output. Rather than being preemptive, this feedback is directly related to what the learner has just said and, arguably, to what the learner is focused upon. Long (1997) suggested that the learner may notice a recast occurring in the context of negotiated interaction by virtue of its (a) being clear in meaning and (b) following the learner's own utterance:

> when the intended message is clear to the learner and his or her attention is focused on the other speaker, the fact that semantic content is already at least partially clear also means that more processing resources can be oriented... to the form of what the interlocutor says next (p. 38).

Research in educational psychology has suggested that this principle of contiguity is true of learning in general. Bruner (1961; 1966; 1973; cited in Driscoll, 1994), for example, asserted that, in order for feedback to be usable, it had to be relevant to the learner, both in terms of meaning and level (i.e., within the processing capacity of the learner). Feedback provided through interaction may serve both these purposes in that the learner is always "the other side of the bargain" when engaged in collaborative discourse. That is, where communication is the goal, both the learner and the interlocutor work towards mutual comprehension. The learner's very participation ensures that the language remains at a level with which he or she can cope (van Lier, 1988). Feedback provided through negotiation, recasts and scaffolding is meaningful because it directly concerns the learner's own focus - what he or she is attempting to say or to understand.

2.1.5 Summary

In summary, negotiated interaction, which may include recasts and scaffolding, and results in linguistic and conversational modifications, is hypothesised to promote acquisition, because it assists comprehensibility, facilitates communication and increases saliency of forms in the L2. Interaction has been found to affect SL development in a variety of ways including: assisting L2 comprehension (Gass & Varonis, 1994; Pica, 1994) and production (Gass & Varonis, 1994; Pica, Holliday, Lewis & Morgenthaler, 1989; Swain, 1985; 1995) promoting IL development of morphosyntactic structures (Mackey, 1995; in press); and lexis (Ellis, Tanaka & Yamazaki, 1994; Loschky, 1994). While such research has demonstrated that interaction can facilitate SL development, the processes involved and reasons why interactional modifications appear to promote SL development remain hypothetical. How does input to the learner become *intake* (Corder, 1967; Sharwood Smith, 1991; 1993)? In other words, setting aside the problems of brain functioning, how do learners internalise and make use of the language they hear? How does the learner's participation in interaction contribute to the internalisation of data? True of all aspects of language learning (Schmidt, 1995), attention

(specifically, *noticing*) is recognised as a key element in the contribution of interaction to acquisition (Ellis, 1991; Faerch & Kasper, 1986; Gass, 1991; 1997; Gass & Varonis, 1994; Long, 1997).

2.2 Interaction, noticing and interlanguage development

Gass and Varonis (1994) highlighted the importance of attention when describing how negotiation facilitates acquisition:

> [negotiations] crucially focus the learner's attention on the parts of the discourse that are problematic, either from a productive or a receptive point of view. Attention in turn is what allows learners to notice a gap between what they produce/know and what is produced by speakers of the L2. The perception of a gap or mismatch may lead to grammar restructuring. (p. 299)

Three important processes in SLA are evident in Gass and Varonis' claim. First, interactional modifications arising from problems in production or comprehension help to focus learner's attention on language form[2]. Secondly, learners' attention is drawn in particular to gaps between what learners know and produce and what they perceive in the TL input. Thirdly, such noticing may lead to destabilisation and IL restructuring (Ellis, 1991; 1994b; Gass, 1991; 1997; Gass & Varonis, 1994). These processes of noticing, comparison and integration (Ellis, 1991; 1994b) are illustrated in Example 6 below, in which a NS and a NNS are engaged in task-based interaction. The NNS must discover the story behind a series of pictures.

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[2] While arguing that non-salient forms might become noticed by learners through the feedback that occurs in negotiation work (Long 1996; Oliver 1995), there has been the recognition, both in first and second language acquisition research, of the need to demonstrate at the most fundamental level the existence of negative evidence, and then the perception and use of it by learners (Beck & Eubank 1991; Pinker 1989). While the issue of negative evidence is not dealt with here, this study essentially addresses the claim that learners do perceive the feedack provided to them, at least in the case of recasts and, to a lesser extent, considers the extent to which learners then use that input.

Here, the NNS is given multiple recasts on similar question forms. Initially the NNS simply uses declarative word order preceded by a question word (line 1). The next two trials in subsequent turns reflect some destabilisation in her use of this form as she struggles with subject-verb inversion (lines 4, 7).

Example 6 Intensive recasts IndoF

1. NNS why the young why the young man is very happy?
2. NS why is the young man happy?
3. NNS yes

[later turn]

4. NNS mmmm what are what are here what is here doing older what what is the older man is he doing?
5. NS what is the older man =doing=?
6. NNS =Yeah=

[later turn]

7. NNS yes (.) and what does he what what younger man are what younger man is think thinking?

2.2.1 The process of noticing

Schmidt and Frota (1986), reporting on a diary study of Schmidt's learning of Portuguese, appear to provide the most quoted evidence for the link between noticing and acquisition. In their study it was found that verb forms in general conversation with Portuguese friends were often noticed after instruction. They gave the following example;

> Wednesday night A came over to play cards, and the first thing he said was: *eu ia telfonar para você [I was going to call you]*, exactly the kind of excuse [the teacher] had said we could expect. I noticed that his speech was full of the imperfect, which I never heard (or understood) before, and during the evening I managed to produce quite a few myself... .(p. 279)

Schmidt (1990) pointed out that, following instruction, his awareness of a form coincided with his ability to "hear" it in the input. Although the form was available in the input prior to this, he was now conscious of hearing it and was able to produce it for the first time. Schmidt stressed the role of conscious learning, suggesting that input was only able to be processed by the learner once it was noticed. Input could not lead to intake and subsequent integration in interlanguage (IL) production unless it was first noticed. As part of his hypothesis, Schmidt (1990; 1994; 1995) proposed that for adult SLA, unlike FLA, there had to be deliberate attention, claiming that "noticing is the necessary and sufficient condition for the conversion of input to intake for learning" (1994, p. 17). The construct of noticing is discussed in further detail in a later section of this chapter.

Factors which have been suggested to influence what learners notice, that is, what elements within the input become intake, include: readiness of the learner (Pienemann, 1989); frequency and saliency in the input (Bardovi-Harlig, 1987; Ellis, 1994b; Gass, 1997; Harley, 1994); L1 influence (Zobl, 1979); prior knowledge (Ellis, 1994b; Gass, 1997; Harley, 1994); familiarity and/or novelty of the input (Ellis, 1994b); the degree to which the discourse is understood (VanPatten, 1990; 1996); relevance and contiguity (van Lier, 1994); and the attentional resources available to the learner (Harley, 1994; VanPatten, 1990; 1996). Specific to SLA, intake may be understood in terms of assimilation of what is noticed with the existing interlanguage grammar system of the learner.

2.2.2 The process of comparison

Gass and Selinker (1994) described intake in the following way:

> it is where information is matched up against prior knowledge and where, in general, processing takes place against the backdrop of the existing internalized grammatical rules. It is where generalizations and so-called overgeneralizations are likely to occur; it is where memory traces are formed; and finally, it is the component from which fossilization stems... Some of the

> major processes that take place in the intake component are hypothesis formation, hypothesis testing, hypothesis modification, and hypothesis confirmation. (p. 303)

The processes of comparison, hypothesis testing and modification arise from the perception of a mismatch or conflict between the learner's prior knowledge and incoming L2 data. In view of the theoretical work of Bruner and others[3] (Ausubel, Novak, & Hanesian, 1978; Bruner, 1961; 1966; 1973; cited in Driscoll 1994), it is crucial that when learners do perceive a mismatch or conflict, the feedback they receive is meaningful and relevant both in terms of content and difficulty level. As discussed above, certain aspects of interaction provide learners with input which is uniquely attuned to their own output, that is, both meaningful and relevant. When a learner receives feedback on her production, either in the form of a recast, or a signal to rephrase the utterance, this feedback comes just as the learner's attention is focused on the message and how to say it (Long, 1997; van Lier, 1994).

2.2.3 The process of integration

In second language acquisition theory, conflict leading to destabilisation and restructuring is a key theoretical notion. White (1987) wrote of *incomprehensible input*, or the need for a problem to occur in order for change to result. Gass (1991) and Pica (1992a) defined negotiation as conversational and linguistic modifications resulting from a communication difficulty. Recasts occur in response to a non-TL utterance, although not necessarily always to a communication difficulty. Theoretically, it is when learners are confronted by a mismatch or conflict between their IL grammar and the TL that change may potentially occur; that is, when learners recognise the problem as one originating in their own IL grammar (Faerch & Kasper, 1986).

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[3] While not providing a model for SLA, general processes in adult cognition and learning are clearly relevant to processes of language acquisition.

2.2.4 Conflict as a catalyst for change

Once again, when we consider general learning theory within a Brunerian framework, it is not surprising that interactional modifications play a key role in acquisition. Describing child cognitive development, Bruner (1964) argued that it was contrasts leading to cognitive conflict which promoted changes in cognitive structure, and that such conflict arose as the child interacted with her world, be that interaction cultural, social, linguistic or physical.

If interaction provides the context for conflict to occur, interactional modifications may serve to highlight that the problem exists. This is seen in Example 7 below. When her interlocutor does not understand her initial question (line 2), the NNS struggles to rephrase her utterance (lines 5, 7). Her final attempt is confirmed by the NS (line 8).

Example 7 *ThaiF*

1. NNS why the other people ah don't do something when he saw the gun?
2. NS don't understand
3. NNS you don't understand?
4. NS why
5. NNS when the other people the opposite
6. NS when the other person
7. NNS yeah when the other when the other person ah saw the gun why doesn't he (.) don't do anything he doesn't do anything why doesn't he do anything?
8. NS why doesn't he do anything?
9. NNS yeah
10. NS ah cos he has a gun as well

To recognise whether or not learners do notice differences between their IL and the TL input, and to understand how crucial such noticing is to acquisition, require further empirical work and a clearer definition of the term noticing. This dissertation seeks to provide such evidence by defining and measuring noticing in the context of oral interaction. Section 2.3 outlines notions of attention, noticing and awareness.

2.3 *Attention*

Within an understanding of noticing as the necessary condition by which input becomes intake, that is, L2 data which is processed or usable by the learner (Gass, 1991; 1997; Schmidt, 1990; 1993; 1994; 1995) [4], noticing is intrinsic to acquisition.

Essentially, Schmidt (1993) argued that, as noticing was entailed in encoding a stimulus into long-term memory, it was therefore necessary in language processing. Schmidt hypothesised, further, that there had to be a specific focus: "What must be attended to and noticed is not just the input in a global sense but whatever features of the input are relevant for the target system." (p. 209) While Schmidt (1990) argued that all that was noticed became intake for the learner, Gass' (1997) description of the process by which input becomes intake was more detailed and more conservative , in that, while only that input which was noticed became intake, intake represented a subset of what was noticed, at the level of apperception. The differences between these two notions of intake are clarified only by a more detailed understanding of attention and noticing.

A simplified version of Gass' model is provided below in Figure 2.1, focusing on relationships among input, noticing and intake. Within this model, intake represents that input which is available for further processing by the learner. Intake may lead to interlanguage development or may remain in storage for future reference: like disparate pieces in a jigsaw waiting for companion pieces to make their function apparent.

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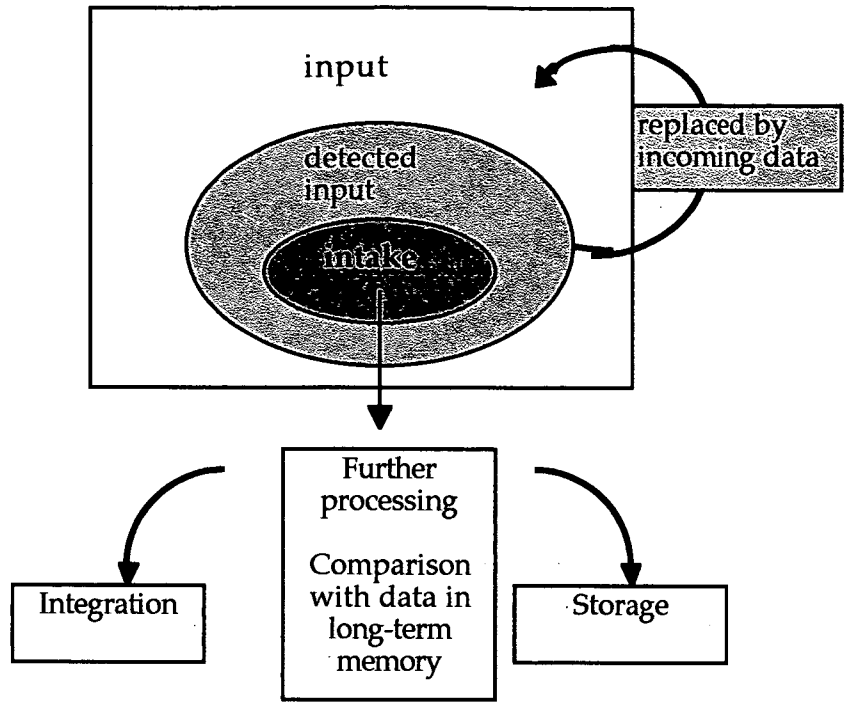
[4]In fact, when noticing is understood as it is in the field of cognitive psychology, as the cognitive registration of input stimuli, distinct from notions of *consciousness*, noticing describes the process by which input becomes intake.

Figure 2.1. Relationship between input, noticing and intake (simplification of Gass, 1988; 1997)



Noticing, attention, focus, awareness and consciousness are all terms used in SLA literature to describe the degree to which the learner registers a particular linguistic form as he or she encounters and makes sense of L2 input. While these terms are very general, in the literature of cognitive psychology they each have quite particular meanings and are theorised to have distinct roles within learning. In this section we shall explore the key terms attention, noticing and awareness. The following section provides a brief description of the attentional system, as it relates to an understanding of the concept of noticing.

2.3.1 The attentional system

It is generally accepted that attention is a limited capacity system. As our capacity to perceive, process and interpret all stimuli which surround us is limited, we must be selective of these stimuli. Attention governs both the selection of stimuli and, consequently, the registration of stimuli in memory. No input is available for further processing unless it is attended to. Attention can be given to one stimulus in preference to another and may be oriented overtly or covertly. Given different messages in each

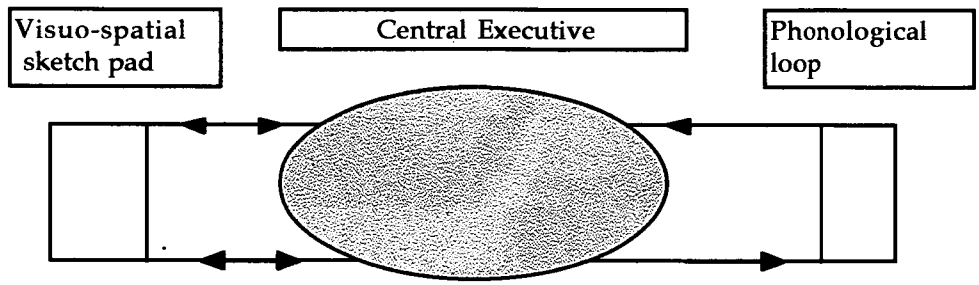
ear, for example, an individual is able to successfully "shadow", that is, simultaneously listen to and repeat one message in preference to another. This has been taken as evidence that we are able to filter out selectively unnecessary information (i.e., the other message) and orient to a particular message (Cherry, 1953; cited in ten Hoopen, 1995). While this is the case, it appears that attention is given at some level to other stimuli, to which we are not overtly oriented. This allows us, for example, to "pick up" our name in someone else's conversation, or to be distracted by a strange noise in the background. Thus, both stimuli are detected, but apparently are processed at different levels.

Following work on shadowing, further studies (Cherry, 1953; Glucksberg & Cowan, 1970; Norman, 1969; cited in Coren, Ward, & Enns, 1994) sought to explore whether at any level, the filtered-out message was also attended to or perceived. Tests revealed that while subjects could not recall any of the unshadowed message *after* a task, if interrupted *during* shadowing they could recall at least five to seven units of the message (words, numbers etc.). This suggests that, at some level, subjects do perceive the unrequired information. This information is available for processing for a short time but, if not attended to, it is not stored in short-term memory. Schmidt's description of noticing, given above, essentially captured this in his claim that input, which was not attended to, was not held in short-term memory and was not available for further processing.

It is not within the bounds of this study to examine in detail the workings of short-term memory (STM) which are indeed complex and the subject of much debate. This study is based on STM termed "working memory", as formulated by Baddeley and Hitch (1974) and further elaborated by Baddeley and others (for review see Baddeley, 1986). In this framework, working memory is conceived as being composed of three subcomponents, as seen in Figure 2.2. A "central executive" controls the allocation of attentional resources and integrates incoming information stored in working memory with information in long-term memory. A "phonological loop" deals with verbal speech-based material, as opposed

to spatial visual images which are handled by a third subsystem, the "visuospatial scratchpad".

Figure 2.2. A simplified representation of the working-memory model proposed by Baddeley and Hitch (1974). From Baddeley (1993, p. 154).



Working memory continually receives and momentarily holds stimulation from the external environment automatically. This information is either replaced by incoming stimuli or may be further processed if attention is given to it (for summaries, see Ashcraft, 1994; Service, 1992). Verbal input to the articulatory loop is held in *phonological store* and may be refreshed through a process of *articulatory rehearsal.* Information recently attended to, while held in working memory, is available for conscious recall, as seen in the filter experiment described above. Units of information may be held in working memory for about 15-20 seconds, although they may be refreshed and so held longer (i.e., by articulatory rehearsal, Cowan, 1988). The rehearsal process itself is limited so that what remains in working memory is a factor of the rate of articulatory rehearsal (e.g., fewer longer words can be repeated in the 2.5-2 seconds available than shorter words) as well as the rate of decay in the phonological store (Baddeley, 1986; Cowan, 1992; 1993).

In terms of the number of units of information that may be held in working memory at any time, opinion appears divided. Earlier research using the technique of shadowing, as described above, suggests 5-7 units, however other research using serial recall report fewer units. Cowan (1995:98) described two studies (Crowder & Morton, 1969; Pollack, Johnson, & Knaff, 1959) in which subjects were questioned at an unpredictable point in a long list of items. The results of these studies

suggest that one is able to attend to only about three items (in this case, words). In other studies on the time limits of working memory, it was found that, given a list of items, subjects recalled as many items as they could repeat in about two seconds (for review see Baddeley, 1986). Thus recall of a list of items appears to be related to the duration of spoken output. Length of words has also been shown to affect accuracy of recall. Cowan and colleagues (Cowan, Day, Saults, Keller, Johnson & Flores, 1992; Cowan, 1992) found that the lengths of those words to be recalled first made a difference, while Baddeley, Thomson, and Buchanan (1975) reported poorer recall on lists of longer words compared to shorter words. Baddeley (1990) attributed this latter finding to spoken duration rather than to the number of syllables in a word, as syllable length can vary (e.g., *wicket* vs *harpoon*). In summary, working memory appears to be constrained, at the least, by (a) how long it takes to rehearse the utterances and (b) the attentional resources available both in terms of attention and activation (Cowan, 1995:101).

Processing resources for working memory are therefore limited and constrain the number and accuracy of processes that can occur simultaneously (Ashcraft, 1994). However, while attentional resources are limited, the extent of these resources is highly complex. It is not the case that attention is unitary. Rather, certain attentional resources may be uniquely allocated to certain modalities and/or tasks. The accuracy with which two or more operations may be performed appears to depend on the similarity of the operations, on the degree of automaticity involved and the distinctiveness of the tasks. This is important when attention is considered in second language acquisition, as complexity of task may affect the degree of attentional resources available. Robinson (1995b) argued that differential performance on tests of implicit and explicit learning might be a function of the processing demands of the tasks rather than a demonstration of conscious/unconscious learning systems (see also Robinson, 1996c). Based on the evidence of an experimental study involving 202 students of Spanish from three different levels, VanPatten (1990) claimed that beginning learners were unable to attend

to both form and meaning, and therefore were unlikely to recover much information on the L2 when engaged in meaningful interaction. It is argued that higher-level learners, in contrast, may be able to attend to both form and meaning as second language learners benefit from the increasing automaticity that comes with repeated practice, allowing attentional resources to be focused on higher-order aspects of speech processing (Ellis, 1994b; McLaughlin, 1987; VanPatten, 1996). Ellis (1994b), for example, claimed that:

> Automatization is of crucial importance in L2 acquisition, not only because it leads to improved L2 performance, but also because it enables the learner to release attention and effort for the controlled processing of new L2 forms. (p. 100)

2.3.2 Noticing

On the premise that input is not available for further processing unless it is first attended to by the learner and registered in memory, noticing is clearly crucial for input to become intake (Gass, 1991; 1997; Long, 1997; Schmidt, 1990; 1994; Schmidt & Frota, 1986).

The claim that interactional modifications lead to noticing of IL anomalies, and that such noticing in turn leads to comparison and integration or restructuring, has proved exceedingly difficult to test. These difficulties stem from problems in operationalising what is essentially internal to the learner (i.e., attention, noticing and awareness).

Tomlin and Villa (1994) identified noticing as a component within attention. They clarified the term "attention" by detailing three distinct components: alertness, orientation and detection. *Alertness* is described as the individual's "general readiness to deal with incoming stimuli or data" (p. 190) and relates to the individual's affective and motivational contexts for learning. *Orientation* involves the directing of attentional resources and may serve to facilitate or inhibit detection. As orientation may be covert, it is difficult to assess experimentally, yet it is of obvious

importance to theories of SLA. Whether for example, a learner is attending to form, meaning or both, and whether learners respond to cues to certain forms in particular in an instructional context (i.e., "to focus on form", Long, 1991; Long & Robinson, 1998) are largely issues relating to orientation. *Detection* refers to the cognitive registration of input, which may or may not be conscious. Detection is selective and makes input available for further cognitive processing (Posner & Peterson, 1990; Tomlin & Villa, 1994).[5] In this sense it is really detection which is involved in the conversion of input to intake and thus is of greatest interest here.

Tomlin and Villa (1994) in fact described noticing as "detection within selective attention" (p. 199), and defined detection as follows:

> the process by which particular exemplars are registered in memory and therefore can be made accessible to whatever the key processes are for learning such as hypothesis formation and testing (p. 193).

2.3.3 Awareness

Noticing a form does not imply an understanding or awareness of the rules or patterns which govern that form, rather, detection is tacit. Studies comparing performance on reaction-time tasks involving sequencing and, using questionnaires to measure subjects' awareness of patterns (see Carr & Curran, 1994) suggest that attention does not necessarily involve awareness, although awareness may enhance the effects of attention. The results of studies such as those of Reber (1967; 1976) on artificial grammar learning (for review see Reber, 1989), or Broadbent (1977; Broadbent & Aston, 1978; cited in Berry, 1993) on the control of complex systems, clearly point to a dissociation between ability

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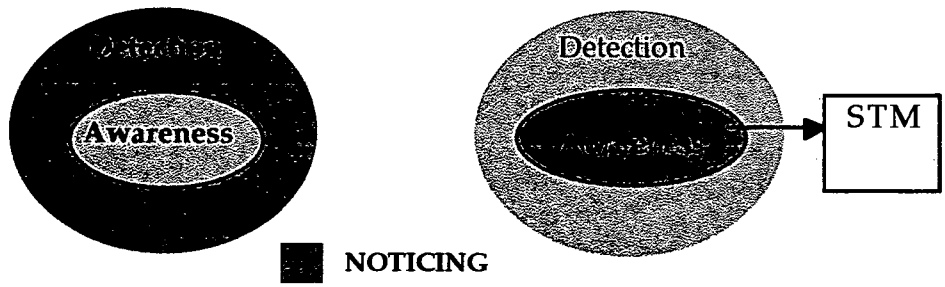
[5] Gass' (1997 and previous) use of the term "apperceived input" corresponds to the term 'detection' used here.

to perform the task and ability to answer questions about the task (i.e., to articulate tacit knowledge), (for review see Berry, 1993).[6]

On the basis of such research, Tomlin and Villa (1994) argued that awareness is not a condition of detection, but detection is a condition of awareness. Robinson (1995b), in contrast and more concisely, distinguished between detection and noticing on the basis of awareness, defining noticing as "detection with awareness and rehearsal in short-term memory ... necessary to learning and the subsequent encoding in long-term memory" (p. 318). These two views are represented in Figure 2.3 below.

Figure 2.3. Two views of noticing

a. Tomlin & Villa (1994) b. Robinson (1995b)



For Robinson, what was crucial was that the detected form was registered in working memory and so became available for further processing and subsequent inclusion in long-term memory. In this way, noticing is necessarily a step in the acquisition process. However, Robinson did not provide a clear explanation of what was meant by awareness, noting that it was affected by measurement and recognising that:

> (a) the experience of noticing may be fleeting and thus difficult to recall; and
>
> (b) one may be aware of, yet unable to verbalize or otherwise articulate the nature of that which one is aware of (p. 299).

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[6] The issue of explicit and implict learning and the possibility of unconcious learning (e.g., Robinson, 1997) are not dealt with in this dissertation which focuses only on noticing at the level of immediate recall.

It is initially unclear whether Robinson's concept of noticing was really distinct from detection, given his difficulty in operationalising awareness, however he further elaborated by describing noticing as one step beyond detection, being "what is both detected and then further activated following the allocation of attentional resources" (Robinson, 1995b, p. 297). Both he and Schmidt (1994) clearly wished to distinguish between detection leading to registering in short-term memory and detection as evidenced by transient subliminal exposure effects, such as those measured in priming experiments[7] (Marcel, 1983; Ashcraft, 1994). Schmidt (1995) argued that second language learning must entail awareness and particularly that , "the noticing hypothesis claims that learning requires awareness *at the time of learning*" (p. 26).

Schmidt (1994) defined awareness as the degree of explicit or implicit knowledge involved, including understanding by the learner. He distinguished awareness from attention, and attention from two other aspects of consciousness: *intentionality* , the degree to which learning is intentional or incidental, and *control* , the degree to which an acquired form is automatic or requires control on the part of the learner in production and comprehension.

The relationship between the constructs attention, noticing and awareness, as described by Schmidt (1994), Tomlin and Villa (1994) and Robinson (1995b), are summarised in Figure 2.4. Schmidt separates the constructs attention, intentionality, awareness and control. Tomlin and Villa identify three distinct subcomponents of attention as alertness, orientation and detection. Robinson identifies noticing as being detection (within selective attention) with awareness.

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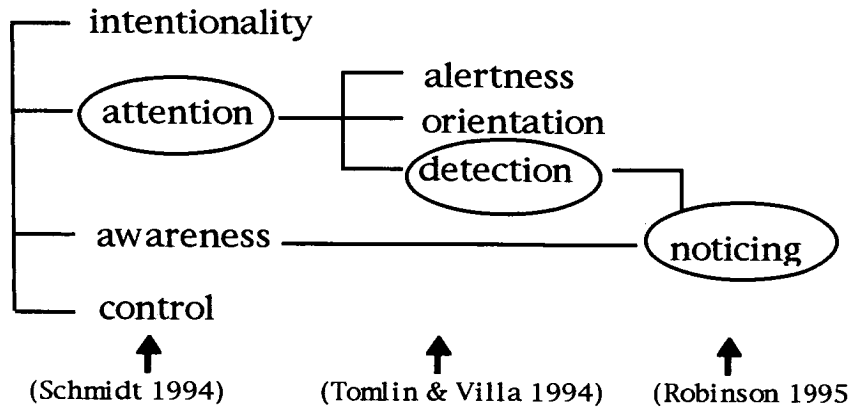
[7] In one semantic priming experiment, for example, subjects' rate of reading isolated words (e.g. *bread*) was positively affected by prior presentation of semantically related words (e.g. *butter* vs *nurse*), even though the subjects were unable to report what the word presented was (Marcel, 1983, also reported in Tomlin & Villa, 1994).

Figure 2.4. Description of attention and noticing



2.3.4 Description and measurement of awareness

Awareness has been understood in various ways. Many relate awareness to explicit learning and, operationally, it involves a degree of articulation. Curran and Keele (1993) for example, in a study examining the role of awareness on learning of structures, operationalised awareness in terms of recall of a pattern (see also Dulany, Carlson, & Dewey, 1984; cited in Robinson, 1993; Reber, 1989; 1992). Schachter, Rounds, Wright, Smith and Magoto (1996) investigated the effect of attention and awareness on the acquisition of embedded questions. In their study they equated awareness with explicit knowledge, operationalising it in terms of an ability to "detect and verbalize the pattern... learned" (p. 2).

Questionnaires have also been extensively used as a measure of awareness by having learners indicate noticing of any rules (Carr & Curran, 1994; Curran & Keele, 1993; Hartman, Knopman, & Nissen, 1989; Nissen & Bullemer, 1987; Robinson, 1995a; 1997). Robinson (1997), for example, used a written questionnaire following treatment to assess levels of awareness. Three direct questions were used to identify three levels of awareness; noticing of rules, looking for rules and ability to verbalise rules.

Finally, Leow (1997) operationalised awareness through the use of think-alouds during a crossword task. Learners' comments were categorised as

demonstrating three levels of awareness: evidence of behavioural or cognitive change; report of awareness; and metalinguistic description. These categories were based on Tomlin and Villa's (1994) definition of awareness. To the extent that awareness is used as a term describing the measurement or operationalisation of noticing (e.g., Leow, 1997), the terms awareness and noticing have been used synonymously by some researchers.

There are two points that are important to note here. First, our measure of awareness will influence our results; learners may not be aware of that which is the focus of the measurement, but they may be aware of something else which is not captured by the measurement. Shanks and St. John (1994; cited in Robinson, 1995b) for example, note:

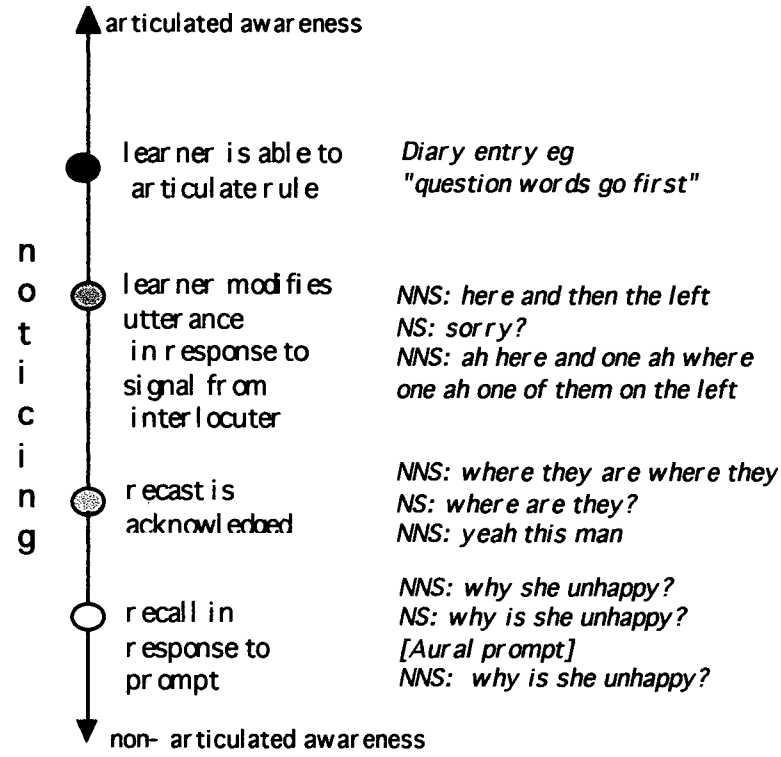
> If subjects have learned something other than rules, then asking them about rules may lead to erroneous conclusions. On the other hand if we ask the subjects questions about what they did in fact learn, we may get reasonable answers. (p. 394)

Secondly, the degree of awareness may be affected by the degree of difficulty of the task. In Schachter et al.'s study (1996), for example, they sought to reduce awareness under one experimental condition by increasing the difficulty of the task through the use of dual tasks.

Awareness may be best understood as being on a continuum, as is implied by Robinson's (1997) study and descriptions by Schmidt (1994; 1995). At one end learners may be able to articulate a metalinguistic awareness of a form, for example to articulate a rule or note a rule in an entry in a diary study. At another level, there may be recognition of a pattern, without the ability to articulate the rule behind the pattern. Similarly, learners may acknowledge the response of a NS in conversation, such as a recast, to be in some way similar in meaning yet different in form to their own previous utterance, without being able to reproduce the recast themselves. This continuum is illustrated in Figure 2.5 below, using examples specific to the context of interaction rather

than to empirical testing of explicit/implicit learning. In some ways this corresponds to Schmidt's (1994) description of awareness as degrees of explicit or implicit awareness: in this case, represented by the degree of articulation required of the learner.

Figure 2.5. Continuum of awareness



Examples of different levels of awareness are provided in further detail in the following section in which different approaches to operationalising noticing, specific to language acquisition, are reviewed.

2.4 Previous studies of noticing

In SLA research, attention has been examined within an instructional context, and because of this results have often been confounded by other variables, such as awareness and consciousness.

As Tomlin and Villa (1994) pointed out:

> ... past research in SLA has identified a central role for attention in SLA, both naturalistic and instructed, but the views of attention we have held have been somewhat naive and limiting (p. 198).

Many SLA studies have suffered from unclear constructs and the demonstrated effects of noticing have often entailed more than noticing (Truscott, 1998). The challenge for SLA research is to incorporate the findings of more finely tuned and principled research on attention from other fields and to find ways to explore further these findings within the instructional context.

In this section, different approaches to the problem of exploring the role of attention in second language acquisition are briefly described. As it is the research method which is of interest here, results for each study appear briefly.

2.4.1 Qualitative research : diary studies

As noted above, Schmidt and Frota (1986), reporting on a diary study of learning Portuguese, appear to provide the most quoted evidence for the link between noticing of forms in the input and their emergence in production. In this study of the acquisition of 21 verbal constructions, it was found that those forms the learner produced were also those that had appeared in diary notes: "the forms that I produced were those that I noticed people saying to me" (Schmidt, 1990, p. 140). On this basis, Schmidt stresses the role of conscious learning, suggesting that input is made available for production in IL once it is noticed and becomes intake.

While commending the study for providing potentially supporting evidence for the necessity of noticing, Tomlin and Villa (1994, p. 185) suggested that it fell short of this, in that such observations failed to show how noticing operated in real time, that is, as L2 input was being processed by the learner. It is argued that diary studies such as Schmidt

and Frota's provide a partial view of some of the learning processes, but involve more than noticing and fail to arrive at actual processes.

2.4.2 Experimental research

Schachter et al.'s (1996) study sought to test directly the effects of attention on second language learning. The researchers equated awareness with explicit knowledge, operationalising it in terms of an ability to "detect and verbalize the pattern... learned" (p. 2). The study, involving 68 ESL learners, investigated the effect of attention and awareness on the acquisition of subjacency constraints on movement. Input was provided through reading and comprehension exercises using computer-assisted language learning (CALL) tasks twice a week for four weeks. Sessions involved a series of reading tasks in which subjects were exposed to multiple instances of the target structure. A training component differed between groups, under three conditions: (1) a rule condition, in which the rule was explicitly taught; (2) a focus condition, in which examples provided inductive training; and, (3) a dual-task condition, in which a distracter task was included involving word substitution. Post-test performances were then compared between groups. The first and second conditions were designed to assess the issue of awareness and the second and third conditions, the issue of attention. While the attentional groups performed better after treatment than the non-attentional (dual task) group, there was no significant difference between the rule group and the focus group, suggesting that awareness at the level of knowledge of a rule provided no learning advantage over "no" awareness. This conclusion is a little problematic, however, in that, although the focus condition involved no explicit description of the rule, learners were likely to have induced the rule through completion of the exercise. This adds to the debate on implicit/explicit learning but does not necessarily demonstrate lack of awareness in the larger sense--only in a very restricted sense of explicit knowledge.

Interestingly, the study also found that learners under the dual-task condition were able to benefit from the input in spite of having their

attention oriented away from the targeted form by a word-substitution task. Again, it is questionable whether the distractor task actually did result in non-attention of the targeted form, or whether in some way it may have contributed to noticing of the form.

Schachter et al.'s study, while experimentally rigorous in testing a relationship between attention and acquisition, reflects the difficulties associated with assessing awareness and attention. The tasks involved reading and writing and individual instruction rather than oral production in the context of interaction.

Robinson's (1995a; 1996a; 1996b; 1997) research, also examining the effects of different levels of attention and awareness on targeted structures, is interesting in comparison in that he differentiated three levels of awareness rather than just presence or absence of awareness. NNS subjects (N=104) were assigned to one of four groups (two implicit and two explicit): an implicit condition, an incidental meaning-oriented condition, an explicit rule-search condition and an explicit-instructed condition. Subjects were individually provided with target sentences by computer and oriented to the data in particular ways, in accordance with their group. Following treatment, subjects were given grammaticality judgment tasks, an aptitude test and a questionnaire designed to measure levels of awareness, as described earlier. While noticing of forms was reported by all groups, a significantly higher proportion of the two explicit groups reported looking for rules compared to the implicit groups. There was no significant correlation between (a) awareness, at the level of reporting noticing of rules and (b) accuracy, as measured by the grammaticality judgment test. In addition, looking for rules and the ability to verbalise rules had a significant positive effect for those in the implicit condition groups on all rules and for those in the rule-search group on certain rules.[8]

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[8] Robinson's research also dealt with the issues of consciousness and aptitude in second langauge learning. Only those results directly relevant to the issue of noticing and levels of awareness are reported here.

Robinson's study points to the usefulness of identifying different levels of awareness. However, as Leow (1997, p. 472) remarked, Robinson administered the questionnaire measuring awareness following the grammaticality judgment task, and learners may have been responding to this task as much as to the treatment sessions themselves. Timing is obviously a difficulty with any such questionnaire, as administering the questionnaire prior to the post-test may have also compromised the results of the test by orienting learners in a particular way.

2.4.3 Think-aloud protocols

As a means of overcoming the problems inherent in post-treatment measures of awareness and noticing, others have used concurrent *think-aloud* protocols as a means of assessing noticing *on-line*. Typically, learners are instructed "to think aloud", recording their speech, as they carry out particular tasks. Alanen's study (1995) assessing noticing during reading tasks used a think-aloud procedure for this purpose. L1 English beginning learners of Finnish (N=36) were placed in one of four groups: a control group, and three treatment groups: an implicit group in which targeted structures (locative suffixes) were visually enhanced; an explicit group in which explicit rules were given; or a combined group in which both occurred. On tests of targeted items following tasks, it was only those learners who reported noticing the targeted items in the reading passages, who acquired the items. In addition, generally, what was noticed was acquired, regardless of the treatment provided in the tasks; whether explicit rules or input enhancement or both had been given. The think-alouds also revealed different effects of the different treatments on focus of attention in learners.

Swain and Lapkin (1995) reported on a think-aloud procedure used in a writing task, in which 19 Grade 8 French immersion students were asked to think aloud as they individually composed and corrected a text. In this study, think-alouds were used to provide evidence of learners' awareness

of their own language knowledge. Swain and Lapkin hypothesised that producing language would lead learners to recognize gaps or inconsistencies in their L2 knowledge. This recognition would in turn motivate learners to use their own linguistic resources to attempt to fill that gap. Their research questions concerned whether learners, in producing L2 (operationalised as writing a text), became aware of gaps in their linguistic knowledge and, if gaps were noticed, how they attempted to resolve these problems. Their use of think-alouds did provide evidence of learners' thinking about lexical, pragmatic and grammatical form, as they were writing. Further, Swain and Lapkin found that the extent to which pragmatic and grammatical form was noticed differed according to the level of the learner.

Again, with an individual written task, Leow (1997, 1998b) used think-alouds to measure *on-line* noticing of form, in much the same way as Alanen (1995), although Leow used the term awareness rather than noticing. He defined noticing as "some form of subjective awareness of new targeted linguistic forms in L2 data as revealed in learners' think-aloud protocols produced while completing a problem-solving task" (Leow, 1997, p. 474). He operationalised noticing as any verbal or written correction or comment on a targeted form.

Leow (1998b) examined types and amount of exposure, comparing teacher-centered (TC) and learner-centered (LC) lessons. In the TC-lesson, examples of forms were provided with key differences underlined. In the LC lesson, learners were given a problem solving task, that is, a crossword puzzle, which entailed the use of the targeted forms. While completing the puzzle individually, learners were instructed to record their thoughts on tape. Leow found that the LC-group outperformed the TC-group on all post-tests, and differences were sustained three and a half months after exposure. He attributed this difference to a difference in attention: learners in the LC-condition were required to attend to the targeted forms to complete the task, that is, their participation was ensured, whereas this might not have been the case in the TC-condition.

Leow (1997) provided a detailed analysis of the think-aloud protocols used in the learner-centered group. Corrections and comments made by learners were classified as one of two levels of awareness: (a) reflecting cognitive change and metalinguistic awareness, with or without verbalisation of the underlying morphological rule; or (b) cognitive change, without metalinguistic awareness or verbalisation of the rule. In the latter case, the learner simply corrected an answer in the crossword (e.g., "17 down it's *tu* so it turns *se dormieron* to *se durmieron"),* without further comment. Leow found that those learners who displayed awareness at the level of cognitive change and meta-awareness significantly outperformed those who did not on recognition tasks and, to a lesser extent, on written tasks.

Think-aloud procedures obviously lend themselves to use with written data rather than oral input. However, in a recent study, Mackey, Gass and McDonough (1998; Gass & Mackey, 1998) used a variation on this technique to tap noticing of form by learners during oral interaction. Using stimulated recalls, learners were asked to respond to video replays of their own task-based interaction with NSs. At particular points in the interaction (i.e., during sequences of interactional modification), learners were asked to recall what they were thinking at the time. Noticing was operationalised in terms of the learner's perception of feedback provided during these stimulated recalls, as measured by the learner's articulation of reasons for their response to the feedback. The researchers noted a much higher proportion of comments relating to lexical, semantic and phonological errors than morphological or syntactic errors and suggested that this reflected what learners noticed in such interaction. This study, although not "on-line", provides one way of examining noticing in the context of oral interaction.

While the results of the studies outlined above are illuminating in what they reveal of learners' processing of input, the validity of think-aloud procedures as a measurement of noticing is problematic. As think-aloud

procedures involve the verbal articulation of ideas, they can measure at best only what the learner is consciously aware of and therefore, like diary studies, provide only a partial view of language learning processes. While think-alouds do provide evidence of when noticing does occur, they capture noticing at one level. As Robinson (1995b) noted, noticing may be fleeting and failure to notice cannot be inferred by a failure to verbalise something. Describing the use of think-alouds for investigating mental processes in problem-solving and mental arithmetic, Lyons (1986) argued that introspection does not access actual processes of cognition but "replays" perceived performances through memory and imagination:

> what we gain access to... is a private and personal storehouse of myriad public performances of ourselves and others, edited and "replayed" according to largely stereotyped views about our cognitive life (p. 148).

Furthermore, in second language acquisition studies there is the obvious problem of the language of report: Whether thoughts are vocalised in the L1 or the L2, while the learner works on task, may itself affect the cognitive procedures and learning strategies used (Mangubhai, 1992).

In spite of these limitations however, the use of think-alouds remains one of the few means of measuring internal processes in language acquisition studies.

2.4.4 Underlining forms in a text and recall

Avoiding the evident problems of verbalisations, Fotos (1993) operationalised noticing as the learner's ability to underline targeted forms in a short story or dictation exercise. In a post-test, following instruction, learners were asked to "underline any *special use* of English" (p. 390). Fotos compared noticing of three targeted structures for three groups: a group which received a teacher-fronted grammar lesson, a group which engaged in interactive grammar problem-solving tasks and a control group which performed communicative tasks. Fotos found no significant difference between the teacher-fronted group and the

interactive grammar-task group on noticing and no significant difference between these two groups on gains on post-test performance. However, both these groups noticed significantly more of all targeted structures than the control group.

Also using retrospective accounts, learners in a study by Slimani (1989) were asked to note down what they noticed or learned from a lesson. The items they listed in "uptake charts" were compared with transcripts of the classes. Slimani found that what occurred in uptake charts were most commonly items that had been topicalised by students, rather than those initiated by the teacher.

In Fotos' study, results may have been confounded by the researcher also playing the role of the teacher. Recall, rather than noticing, may have been measured by this task. Fotos did not attempt to investigate if there was any correlation between noticing and development.

Both studies used retrospective accounts of noticing and hence did not investigate whether noticing led to acquisition, but rather the coexistence of noticing and acquisition.

2.4.5 Enhanced input, assumed learner noticing

In some studies, noticing has been assumed rather than measured directly, for example, when input enhancement was an independent variable. In Doughty's (1991) empirical study of the effect of instruction on the acquisition of relativisation in ESL learners, she used computer-assisted language learning programs to provide individual instruction to three groups of learners (two treatment groups and a control group). In this study, instruction was provided as (a) enhanced input, in which forms were highlighted in a reading text and (b) explicit instruction on relative clause formation. Although noticing of form was not directly measured, it is argued that both the instructed group and the group receiving enhanced input attended to form, and both groups outperformed the control group.

Other experimental studies have also manipulated the learners' attention towards form and/or meaning by the task required. Hulstijn (1989; cited in Long, 1997) for example, using CALL, compared a form-oriented group, which was instructed to manipulate the order of forms in accordance with a model sentence, with a meaning-oriented group, which was given the task of rating agreement with target sentences. Other examples include: explicit discussion of linguistic form (Leow, 1998b); instructions to listen for specific grammatical morphology as opposed to lexical items or content alone (VanPatten, 1990); rules applied to examples (N.Ellis, 1993) and multiple-choice margin glosses (Hulstijn, 1992; Watanabe, 1992; cited in Long, 1997).

2.4.6 Quasi-experimental classroom studies

Quasi-experimental classroom studies are also noted for providing evidence on the effects of enhanced input, in which targeted structures were made more salient through error correction, highlighting, explicit rules and input flooding (Lightbown & Spada, 1990; Spada, 1997; Spada & Lightbown, 1993; Tomasello & Herrron, 1989; White, 1991; White, Spada, Lightbown, & Ranta, 1991; for review see Long, 1997; Long & Robinson, 1998). In a series of experimental studies in intensive ESL classrooms, for example, Lightbown, Spada, and colleagues (Lightbown, 1991; Spada & Lightbown, 1993; White, 1991; White et al., 1991) explored the effects of focused instruction and corrective feedback on adverb placement and the formation of *yes/no* and *wh* questions. For both structures, the experimental groups significantly outperformed the control groups in immediate and delayed post-tests following a two-week instruction period. However, in follow-up post-tests six months to a year later, effects were sustained for question forms but not for adverb placement. The difference in retention was attributed to the higher incidence of question forms, allowing for continued input and output opportunities, compared to the rare use of adverbs in classrooms.

In a more recent study, also examining the effects of instruction on question development, Lightbown and Spada (in press) specifically investigated the interaction between developmental readiness and instruction on acquisition of question forms. The effect of L1 on question development was also examined. Readiness and acquisition were defined in terms of the Pienemann, Johnston and Brindley (1988) six-stage model of question development in ESL. The study involved five intact intensive ESL classes (N=144) of Grade 6 francophone students in Quebec. These classes received one hour per day of "input flood" over two weeks, that is, instruction which provided high frequency exposure to particular question forms. There was no explicit presentation of rules. Learners were producing question forms at a level lower than those presented through the activities and tasks in pre-test performance. A post-test and delayed post-test of four different measures, both written and oral, spontaneous and guided, demonstrated that some, but not all learners changed in their level of question-form production, particularly those learners who were at the lowest level initially. Lightbown and Spada compared the results to those from previous studies by Pienemann (1984; 1989), which had targeted the same forms but involved explicit instruction. They concluded that the findings:

> suggest that explicit developmentally appropriate instruction led to progress. The explicit instruction may have been more successful in drawing learners' attention to the forms than the input flood in this study. (p.21)

As was true of the experimental studies on input enhancement described in the previous section, in these studies, noticing of forms by learners was not measured but assumed. Here attention to form by learners is given as an explanation of performance.

2.4.7 Enhanced input in oral interaction

Finally, the effects of interactional modifications on language development have been indirectly tested by a number of studies. In these studies the use of intensive recasts or negotiated interaction was argued

to focus learners' attention on form by increasing the saliency of that form. These studies provided a way of linking interactional modifications and interlanguage development but, as yet, there is no study that focuses on the extent to which learners attend to form as a result of interactional modifications.[9]

In a carefully controlled study of the effects of different types of interaction on the short-term development of morphosyntactic structures, Mackey (1995; in press) used interactive tasks designed to elicit particular morphosyntactic structures which have been shown to develop in a particular sequence (Pienemann & Johnston, 1987). Mackey found a positive effect for negotiation on IL restructuring. The effect of the treatment conditions on the interlanguage development of 34 adult ESL learners was operationalised by targeting question forms. All question forms elicited through the pre-test and post-tests were assessed as belonging to a developmental level. This analysis followed the developmental sequence for question formation in ESL identified by Pienemann and Johnston (1987) and Pienemann, Johnston and Brindley (1988) and further described in Lightbown and Spada (1993; in press).

Mackey's study provides a model for examining the relationship between interlanguage development and modifications arising out of spontaneous oral interaction.

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[9] In a small study of six learners in NS-NNS dyads, Nobuyoshi and Ellis (1993) investigated the effects of feedback on past tense production, by providing learners in an experimental group with clarification requests after any past tense error in task-based interaction. Two of three learners were able to reformulate their past tense production in response to clarification requests and these learners maintained accuracy in post-test production one week later. While helpful as an exploration of the effect of implicit feedback on interlanguage development, the study suffers from two major problems. First, sample size was too small to provide anything but a modest indication of possible effects. Secondly, the analysis of tense in the study was limited and apparently not based on any empirical notion of development.

In a related study of the effects of recasts on the production and development of morphosyntactic structures, and using the same experimental design, Mackey and Philp (1998) compared two experimental conditions during three sessions of dyadic NS-NNS task-based interaction. Under the first condition, learners interacted with native speaker interlocutors on tasks. The second condition was similar except that learners received recasts of all non-target-like utterances during their interaction. The control group participated in pre- and post-tests only. Both test and treatment sessions lasted approximately 15-20 minutes and consisted of three tasks in which question forms in particular were elicited.

Mackey and Philp (1998) found that recasts in the context of task-based interaction correlated with increased production of question forms at higher levels for some learners. This effect was greater than that found for task-based interaction alone. In addition, it was found that learners seldom repeated or modified their utterance in response to a recast. Rather, they tended to continue with the task. This is relevant to the present study, as it suggests that a lack of immediate response to recasts is not an indication of intake. In other words, the failure to modify or repeat a recast does not indicate a failure to notice the recast form.

Gass and Varonis (1994) compared the effects of negotiated and non-negotiated interaction and of modified input and unmodified input on (a) comprehension and (b) production. The study involved 16 NS-NNS dyads who performed two similar directions tasks, in which partners took turns to give instructions about where to place objects on a picture board. Both comprehension and production were measured by success in following directions. Gass and Varonis found that while both negotiated and modified input positively affected comprehension, negotiated interaction, but not modified interaction, significantly affected ability to give directions. Through interacting on tasks, it seems that learners picked up strategies and features of the target language that assisted clarity in giving directions. Gass and Varonis' study did not investigate the

effects of interaction on language acquisition, however it was important in providing further evidence for a link between interaction and enhanced production.

Two studies investigating the effects of different input conditions on the comprehension and acquisition of lexical items (Ellis et al., 1994; Loschky, 1994) found that negotiation had an immediate positive effect on comprehension. However, in terms of the effects of interactional modifications on the acquisition of vocabulary, the results differed. These differences are attributed by Ellis, Tanaka & Yamazaki (1994) as being due to the difference in targeted items. While Loschky (1994), investigating the acquisition of Japanese locative constructions found no effect for retention of targeted items, Ellis et al., in two classroom studies using the same design, found an advantage for those groups which received interactional modifications compared with groups which received pre-modified input and unmodified input on vocabulary tests immediately after treatment. This advantage was sustained over time in one of the classroom studies and between the negotiation group and the control group in the second study.

2.4.8 Summary

In summary, various methods have been used to look at noticing, awareness and interactional effects on interlanguage development, however few studies have dealt with oral interaction. As Long (1997) noted:

> researchers have for the most part restricted the scope of their studies to overt oral error correction during classroom lessons or written feedback on student writing (...) neither case speaks to the ability of learners to perceive and utilise implicit corrective feedback during spontaneous communicative language use (p. 437).

The goal of the research reported in this dissertation was specifically to examine to what extent learners perceive and make use of recasts during spontaneous communicative language use.

2.5 *Attention, noticing and SLA : research focus*

In seeking to understand how interaction promotes IL development, noticing is critical (Gass, 1997; Gass & Varonis, 1994; Long, 1997; Swain, 1985; 1995). As Gass (1997) pointed out:

> The input-interaction view must take the position that noticing is crucial. In negotiation the learner is focusing on linguistic form, and that focus, or specific attention paid to linguistic form, is the first step toward grammar change. (p. 101)

Logically, if L2 input is to be used by the learner and be available for further processing, it must be noticed at some level. Interaction is argued to promote noticing not just of L2 input but of L2 input in a very specific context, that is, of L2 input in conflict with the interlanguage grammar of the learner.

Whether or not learners notice language form in the context of spontaneous communication and, specifically, whether they notice differences between what is said to them and what they themselves say or know, is central to the argument concerning interaction. In this, a clearer definition of the term noticing and a means of exploring noticing at the time of oral interaction are essential.

The foci of this study are threefold:

1) <u>The description and measurement of noticing,</u>
   to operationalise noticing, specifically for the investigation of noticing in the context of L2 oral production;
2) <u>NNS' noticing of recasts,</u>
   to examine to what extent learners notice morphosyntactic forms in

recasts provided in interaction and what constrains noticing of these forms;

3) NNS' use of recasts,
to examine whether noticing of forms leads to IL destabilisation or restructuring.

The next chapter outlines the particular research questions and hypotheses and the methodology used in this study.

Research Questions and Hypotheses

CHAPTER 3

3.1 Purpose and rationale of the study

Previous research discussed in Chapter 2 has shown that recasts are one aspect of interaction which can provide implicit negative evidence to learners. Recasts may alert learners to the incorrectness of their utterance by providing an alternate target-like way of expressing the same thing (Long, 1997; Long, Inagaki & Ortega, 1998; Lyster & Ranta, 1997; Mackey & Philp, 1998; Oliver, 1995). A key theoretical argument underlining the effect of negotiation on the interlanguage (IL) development of the learner concerns "noticing". Noticing was defined as detection with awareness leading registration in short-term memory though rehearsal (Robinson, 1995b). It is argued that, if learners are to make use of the feedback presented to them in recasts (and in other forms of interactional modification), they must first notice the anomaly between the recast and their own interlanguage production (Gass, 1991; 1997; Gass & Varonis, 1994; Long, 1997; Schmidt, 1994). Furthermore, they must recognize that the recast is more than just an alternative way of saying what they were trying to say. It indicates a preferred target-language (TL) alternative.

This study examines this claim. Do learners notice modifications made to their non-target-like utterances in the context of task-based interaction? That is, as learners interact with others, as they talk and listen to their interlocutor and while their attention is focused on meaning rather than form, do they notice the feedback they receive?

As noted in Chapter 2, previous SLA research on noticing has tended to use retrospective methods for accessing noticing of input in oral material (Gass & Mackey, 1998; Mackey & Gass, 1998; Schmidt & Frota, 1986) or it

has focused on noticing of forms in written material (Alanen, 1995; Fotos, 1993; Leow, 1997; 1998a; Schachter et al., 1996; Slimani, 1989; Swain & Lapkin, 1995). Unlike these studies, the current research sought to examine noticing in the context of spontaneous oral communication immediately after feedback was given to the learner. Noticing is measured by learners' immediate recall of the words spoken by their interlocutor, not by articulation of their perception of what occurred (see, for example, Gass & Mackey, 1998)

This study was limited to a focus on question forms, as a means of evaluating both noticing of recasts and the effect of noticing on second language development. Specifically, the study examined what learners noticed about morphosyntactic modifications made to their production of question forms. Following Mackey (1995), question forms were chosen as the focus of the study. These were primarily chosen because an order of acquisition for these forms in English as a Second Language (ESL) had been previously established, so that the issue of interlanguage development as a result of noticing could be explored. The acquisition of question forms in English as described by Pienemann and colleagues (Pienemann & Johnston, 1987; Pienemann et al., 1988) has been used as a measure of development by a number of researchers (Lightbown & Spada, 1993; in press; Mackey, 1995; Mackey & Philp, 1998; Spada & Lightbown, 1993). This order of acquisition and stages of development are described in detail in sections 3.2.1 and 3.4.1 of this chapter, and a summary is given in Table 3.2 at the conclusion of the chapter.

Question forms were also chosen as they could be effectively elicited and recast in task-based interaction (see Mackey, 1994b; Mackey, 1995). Further, previous research has suggested that recasts may promote the development of question forms by learners under certain conditions (Mackey, 1995; Mackey & Philp, 1998).

The three major foci of the study within the context of L2 oral production were the description and measurement of noticing; NNS' noticing of recasts and NNS' use of recasts.

A quasi-experimental design was employed for the study in which learners of ESL were paired to work on communicative tasks with native speakers (NS). This design followed Mackey (1995). The various tasks required the learners to ask questions of their NS partners about a picture in order to discover missing information. While engaged on the tasks, the NS partners responded to any non-target-like production of question forms with a recast. Following a recast, learners were unexpectedly interrupted in their next turn by a sound cue. Upon hearing the cue, the learners were to recall the previous utterance (i.e., the recast given by the NS). Task work then continued as before. Essentially the study investigated the extent to which the NNS noticed these recasts, that is, how well they could recall the recast. Pre- and post-tests, using similar tasks in NS-NNS pairs, were used to examine learners' interlanguage production of question forms and development over six weeks.

3.1.1 Focus 1: measurement of noticing in oral interaction

Noticing was described in Chapter 2 as consisting of four components: the learner's detection of elements in the input, entailing the selective attention of the learner, rehearsal in short-term memory and an awareness of form at some level (Robinson, 1995b). As these processes are necessarily internal to the learner, they are difficult to measure.

Within cognitive psychology, two techniques have commonly been used to access detection and rehearsal in short-term auditory memory: shadowing, in which the subject similtaneously listens to and repeats the input given, and recall, in which the subject responds to a cue to "re-play" what was heard at a particular point in the input (e.g., Darwin,

Turvey, & Crowder, 1972; Glucksberg & Cowan, 1970; Moray, Bates, & Barnett, 1965; cited in Baddeley, 1990).

In the present study it was important to preserve the flow of normal conversation[1], yet in some way access learners' short-term auditory storage of recasts at the time the learner heard them. Immediate recall, signalled by a sound cue (rather than a spoken instruction),[2] was used for this purpose. Noticing was thus operationalised as the learner's ability to recall a recast in response to an immediate sound cue: two knocks on the table from the facilitator. The knock was provided by the NS facilitator following the provision of the recast and was unanticipated by the learner. An example of task discourse is provided in Example 1 below. The NNS is asking questions about a picture to discover a hidden story. Following the recast in line 2, the NS gives two knocks. The NNS recalls the recast incorrectly, changing the tense (line 3). In line 7, the NNS again recalls the recast incorrectly. Her partial repetition of the recast, combined with her original question form may be an indication that she notices the use of *"isn't"*, but has little awareness of the recast question form.

Example 1		*KorF*	
1.	NNS	but why she's crying?	
2.	NS	why is she crying? = * * =	*[recast]*
3.	NNS	=yeah= why she cried?	*[recall]*
4.	NS	cos her favorite animal is not there	
5.	NNS	why her favorite animal is not there?	
6.	NS	why isn't her favorite animal there? = * * =	*[recast]*

[1] Clearly any intrusion interrupts the natural flow of conversation to some extent. The transcripts, however, indicate that the use of recall posed minimal interference in that learners remained on task.

[2] Baddeley (1990:31) reported on experiments studying effects on serial recall. One effect found was that items most recently presented were those recalled with greater accuracy (the *recency effect).* Further, an irrelevant spoken item following the target sequence negatively affected performance (Conrad, 1960; cited in Baddeley, 1990). However, a non-speech sound such as a buzzer or tone did not affect performance (Crowder & Morton, 1969; cited in Baddeley, 1990).

7. NNS =yeah= why isn't her favorite animal is not there *[recall]*

* * = *two knocks interrupt the learner's turn following a recast*

A learner's ability to recall the recast accurately was taken as evidence of noticing, because recall reflects detection with awareness and involves rehearsal in short-term memory. It is important to note that this operationalisation of noticing reflects **one** aspect of noticing. It is entirely possible that learners may notice a recast and yet be unable to repeat it. Thus immediate and accurate recall of a recast is regarded as one level of noticing, where awareness is at the level of being able to repeat the recast impromptu (i.e., without prior warning). As described in the previous chapter, awareness is understood as being on a continuum. The use of recall represents an effort to have the students 'replay' what they have retained in phonological short-term memory and corresponds to one level of awareness.

It should be noted that the cue to recall the recast was unanticipated by the learner. The recall cue occurred *after* the recast and thus did not draw the learner's attention explicitly to the recast *before* it was given. Rather, the recast was provided in the course of interaction and may or may not have been observed, and subsequently, recalled by the learner. Some learners appeared to recognise recasts when they occurred, repeating the recast themselves before the cue for recall. Evidently the learner had noticed the recast in these cases. It is true that the frequency of recasts may have led learners to notice recasts more readily than they might otherwise have done in the course of normal task-based interaction, and as a result, to anticipate a cue for recall. This possibility was addressed through a post-hoc questionnaire to learners, as described in Chapter 4, and discussed further in Chapter 7.

3.1.2 Focus 2 : learners' noticing of recasts

As outlined above, the central focus of the research was to investigate to what extent learners were able to recall a recast provided in the context of

meaning-based interaction and to consider what factors might constrain noticing of these recasts.

Learners recall recasts in different ways when engaged on tasks. They may recall the recast correctly, as in Example 2.

Example 2	*KorM*
NNS	where is go now?
NS	well ah= where is she going? = * * =
NNS	=where = where is she where is she going?

They may fail to recall the recast correctly but may modify the recast in some way, as in Example 3.

Example 3	*JapM*
NNS	this (..) is a this ah he (..) he his his house? his house clean window?
NS	ah is he cleaning his house? * *
NNS	is he's clean in house?

Finally, they may fail to recall the recast at all, either repeating their original utterance or admitting that they did not hear the recast, as in Example 4.

Example 4	*JapF*
NNS	his wife his wife where are you going where are you going his wife?
NS	where is his wife going? * *
NNS	eh?

Obviously there are many factors which affect recall, these include simply the fact that the learner was not listening, or that the recast utterance was delivered too quickly, as may have been the problem in Example 4.

As noted in Chapter 2, a number of factors have been posited to affect noticing of input by learners (Bardovi-Harlig, 1987; Ellis, 1994c; Gass, 1997; van Lier, 1994; VanPatten, 1990; 1996). These factors include the pressure of time, the frequency and salience of a particular element, familiarity and prior knowledge of the learner and affective factors such as alertness, motivation and attitude. In this study a subset of five psycholinguistic and linguistic factors which may constrain noticing was considered, as set

out in section 3.2. It was assumed that the factors would be interrelated and not independent. For example, a particular form may be more easily recalled, if it is both short in terms of number of morphemes and simple in terms of syntactic complexity. Both the interrelationship between factors and the influence of individual factors were considered, however, sample size precluded statistical analysis of the former. Essentially the focus here was to test the claim that learners notice " a gap between what they produce/know and what is produced by speakers of the L2" as a result of interactional modifications (Gass & Varonis, 1994, p. 299).

Of interest in this study was whether learners actually noticed, as evidenced by immediate recall, forms that were beyond their level of acquisition. There were three different levels of learners (High, Intermediate and Low). Groups were determined according to learners' production of question forms in pre-tests, corresponding to six stages on the ESL heirachy for questions (Mackey, 1995; Pienemann & Johnston, 1987; Pienemann et al., 1988; Spada & Lightbown, 1993), as explained below.

3.1.3 Focus 3 : learners' use of recasts

A third focus of the study was the extent to which learners used recasts. That is, if learners did notice recasts, to what extent were recasts then incorporated in the learners' subsequent production?

This question was posed to investigate whether learners made use of the feedback they received on their non-target-like utterances, either in subsequent turns within the session or in later use. The impact of interactional modifications on IL production has previously been investigated by Mackey (1995; in press) and, following this, by Mackey and Philp (1998). They found that interactional modifications, including recasts, did result in destabilisation for some learners. Following recasts, learners started to use variations of question forms which, though not always target-like, were different from those they had used previously.

Higher-level learners were found to use more higher-level question forms than previously.

In the present study, incorporation of recasts was investigated through a qualitative analysis of transcripts. Essentially this analysis concerned the link between noticing, intake and short-term development.

3.2 *Research questions and hypotheses*

The three foci of the study then are: the measurement of noticing, learners' noticing of recasts and learners' use of recasts. The first focus of the study, the measurement of noticing, was addressed through the use of recall in the research design. The other two foci of the study were addressed by seven research questions. The first five concern variables hypothesised to constrain noticing of recasts by the learner. The last two questions were explored qualitatively and address the subsequent use of recasts by the learner. A rationale for each is explored in this section.

3.2.1 Research question 1 : level of the learner

RQ1 Is ability to recall a given recast constrained by the level of the learner?

The *level* of the learner was determined according to his or her production of question forms corresponding to six stages on the ESL heirachy for questions (Mackey, 1995; Pienemann & Johnston, 1987; Pienemann et al., 1988; Spada & Lightbown, 1993), as explained below. Three groups of learners were compared: High, Intermediate and Low. Each was at a different level in terms of ESL question development.

There were two reasons for considering the developmental level of the learner as a possible constraint on noticing: the first concerns the issue of L2 representations in long-term memory and automaticity; the second

concerns the issue of readiness. First, it was expected that learners at higher levels (i.e., those in the High and Intermediate groups), having greater automaticity in production, would have greater attentional resources at their disposal. Just as in FLA, children must first develop a degree of automaticity in terms of articulation and word production in order to go beyond sounds and then beyond single word utterances (Bock, 1986), so too, in SLA, learners may have difficulty not only producing but also attending to higher-order aspects of speech processing, before having first attained a base level syntax. Further, simply comprehending the L2 input may have required all available attentional resources for the Low learner, so that attention to the form of the recast was unlikely (VanPatten, 1990; 1996). At times the learner may simply be unable to process the recast utterance because of its complexity, and so be unable to recall it.

Secondly, there is the related issue of readiness which is further explored by the second research question. The work of Pienemann and others (Cancino, Rosansky, & Schumann, 1978; Lightbown, 1980; cited in Lightbown & Spada, in press; Johnston, 1985; Meisel, Clahsen, & Pienemann, 1981; Pienemann, 1984; 1989; Pienemann & Johnston, 1987) has demonstrated that certain structures, including question forms in English are acquired in a fixed order. A six-stage order of acquisition was identified for question forms in English (Pienemann & Johnston, 1987). This order is theorised to be due to certain processing constraints. It is claimed that learners are unable to acquire forms which they are not developmentally ready to acquire, regardless of instruction. The NNS who produced the utterance*"where are you going his wife?"*, in Example 4 above, used a formulaic utterance as a question word. She also produced structures at Stage 3, in which a question word precedes canonical word order such as *" where you have cat?"*. Although she may begin to produce structures at Stage 4, in which subject and auxiliary are inverted, such as *"where is he?"*, she is theoretically unable to generate or acquire questions at Stage 5, such as *"where is his wife going?"*. Mackey (1995; in press), in a study on the effects of interactional

modification on ESL learners' interlanguage development of questions, found that participation in interaction with native speakers, while leading to an increase in production of developmentally more advanced structures, did not lead to stage skipping.

Others have examined this issue of readiness in terms of the learner's prior knowledge, also suggesting that prior knowledge may affect noticing of particular forms. Gass (1997) provided the example of an American in Japan who, from a stream of Japanese in a bus announcement, managed to comprehend a few phrases because of certain key words she recognised. She noticed those words which had a link with L2 representations in memory. Schmidt and Frota (1986) remarked that Schmidt, as a learner of Portuguese, did not notice forms that were abundant in the input until they were highlighted through instruction. Perhaps the forms were not noticed until the learner was *ready*, in terms of psycholinguistic processing or simply because the forms were not previously known, and therefore not recognisable by the learner.

As discussed in the previous chapter, the idea that prior knowledge primes the learner to apperceive specific elements in the input (Gass, 1997) is upheld in general learning theory (Ausubel et al., 1978; Bruner, 1961). Ausubel (1968:36) for example, claimed that we perceive and interpret verbal messages in the light of existing knowledge and that "the most important single factor influencing learning is what the learner already knows..." (Ausubel et al., 1978:163). Bruner (1961; 1966; 1973; cited in Driscoll, 1994) suggested that feedback must be provided in a mode that is both meaningful, (i.e., related to what the learner already knows), and within the information processing capacity of the learner. Hence, readiness, both in terms of prior knowledge and processing mechanims, may modulate the apperception of the learner.

In view of the above discussion, the following hypothesis was tested:

H1 Accuracy of recall is correlated with level of learner, such that the higher the level of the learner the greater the accuracy of recall (High > Intermediate > Low).

3.2.2 Research question 2 : type of question form

The second research question was related to the first and specifically addressed the issue of readiness to acquire a particular question form as a constraint on noticing of that form in a recast.

RQ2 Is ability to recall a given recast constrained by the type of question form?

This question sought to test whether question forms at lower stages were accurately recalled more consistently than those at higher stages and was examined as Hypothesis 2:

H2 Learners will show a significantly higher percentage of correct recall for question forms that are within their level than for question forms that are beyond their level.

Correct recall here concerned the degree to which the recall mirrored the recast utterance. As explained above, subjects could respond differently in how they recalled the recast, with varying degrees of accuracy.

3.2.3 Research question 3 : length

The third, fourth and fifth research questions are all linked to the constraints of working memory and are therefore interrelated. The third research question concerned the length of the recast as a constraint on recall.

RQ3 Is ability to recall a given recast constrained by the length of the recast utterance?

While recall is clearly dependent on working memory, it is more than just a measure of memory. For longer utterances, learners reconstruct meaning to some extent, having recourse to L2 representations in long-

term memory. Recall is not parroting, although for shorter utterances such as *"what is it?"*, it could be simple repetition. Length of utterance may interact with other factors, such as complexity, to affect recall.

In understanding how length of utterance might be related to accuracy of recall, the findings of previous cognitive research on auditory attention are important to note. On the basis of this research, shorter recasts should be more easily recalled than longer recasts, which may exceed the limits of temporary phonological store. Determining the critical length of an utterance, what should constitute *"short"* and what *"long"*, is problematic however.

As discussed in the previous chapter, research on shadowing[3] amongst adult native speakers (Cherry, 1953; Glucksberg & Cowan, 1970; Norman, 1969; cited in Coren et al., 1994) has demonstrated that subjects interrupted *during* shadowing could recall at least five to seven units of the message (words, numbers etc.). However other research (See Cowan, 1995; Baddeley, 1986) has reported serial recall of far fewer units, with rate or rehearsal, and availability of attentional resources being constraining factors on retention. Native speakers may retain seven units only when full attention is given and there is time to rehearse each item. For NNS data, identifying the capacity of working memory is perhaps even more problematic. Lack of automaticity in language production is an added burden. Further, while chunking (Miller, 1956) allows for a number of words or pieces of information to be counted as one unit, what constitutes a unit for second language learners is an unknown. Phrases such as *"what kind of"; "how many"; "in your picture"* for example may be one unit or many.

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[3] "Shadowing" involved the subject similtaneously listening to and repeating messages given through headphones. In the above studies, subjects listened to two different messages, one in each side of the headphone. They were required to shadow one of the messages (either that being heard by the right or left ear).

Given the uncertainties outlined above, a morpheme count was used as a general indicator of length.[4] Longer and shorter utterances were compared. Longer utterances were those of more than five morphemes. In pilot studies, Low learners were generally able to recall utterances of five morphemes or less, such as *"what is he doing?"*, while longer utterances posed difficulties. Thus the arbitrary distinction between long and short recasts on the basis of more than five or less than six morphemes was considered intuitively reasonable.

H3: Accuracy of recall will be higher for shorter recasts than longer recasts.

3.2.4 Research question 4: number of changes

Another factor which may affect accuracy of recall, also affected by working memory, is the number of changes between the learner's utterance and the recast. This was addressed in the fourth research question;

RQ4 Is ability to recall a given recast constrained by the number of changes made to the trigger?

The number of errors occurring in the trigger utterance (i.e., the learner's utterance provoking the recast) has been investigated in SLA and FLA research both in the use learners make of the recast (Oliver, 1995), and in the provision of recasts (Bohannon & Stanowicz, 1988; Doughty, 1993; Farrar, 1992). In this study one change, two changes and three or more changes to the trigger were compared for correlation with noticing (i.e., accuracy of recall). It was hypothesised that the fewer the changes made

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[4] Given the work of Cowan, Baddeley and others, discussed above, in which the word length effect on recall appears to be a function of rate of rehearsal, length of time taken to articulate the recast may have been a more accurate measure rather than a morpheme or syllable count. However the relationship between speech rate and memory span is still a contentious and complex issue (for discussion see Cowan, 1993), involving not only duration of words but also pauses betweeen words. While important, it is beyond the means or goals of this dissertation.

to the original trigger utterance, the greater the accuracy of recall, as learners would have less to process in terms of new input. Conversely, learners may have failed to notice changes which were trivial and, especially, changes which did not affect the meaning of the utterance, as illustrated by the following example, in which only the definite article was added in the recast:

Example 5	*KorM*
NNS	ah is telephone ringing? what what?
NS	is the telephone ringing? = ** =
NNS	=what what= is is telephone ringing?

However, logically, failure to notice such changes would not be affected by the number of changes made to the trigger, as it relates to the question of saliency, although this may be a contributing factor. In other words, if learners failed to notice trivial changes because they were non-salient, they might be as likely to do so in recasts where there were many changes, as they would if there were only one change.

> *H4*: Recall will be more accurate the fewer the changes made in the recast utterance.

3.2.5 Research question 5: type of change

The fifth research question considered the type of change made in the recast as a constraint on recall:

> RQ5 Is ability to recall a given recast constrained by the type of change made in the recast?

Certain recasts may be generally more salient for learners than others. This may in part be because of the type of change made to the trigger utterance. For example, recasts in which the new element is fronted, as in Example 6, may be more easily noticed than a change involving insertion or inversion, as seen in Examples 7 and 8, which is internal to the structure. Linked to this notion of saliency is the issue of psycholinguistic processing constraints. Based on descriptions of second language acquisition of German word-order rules (Meisel et al., 1981) and speech

processing strategies proposed by Clahsen and colleagues (Clahsen, Meisel & Pienemann, 1993; cited in Larsen-Freeman & Long, 1991; Clahsen, 1984), Pienemann and Johnston (1987) proposed that for ESL, questions formed by fronting of canonical word order are acquired earlier than those requiring restructuring internal to the order. Hence the acquisition of Stage 3 type questions (Example 6) formed simply by an initial question word, occurs before Stage 4 questions (Example 7), requiring inversion and Stage 5 questions (Example 8), requiring insertion. Structures in which canonical word order is disrupted demand a higher level of grammatical knowledge. Learners who are able to invert subject and object successfully to form yes/no questions in English, for example, must recognize that these two categories are able to be manipulated. Therefore such structures are argued to be more complex than those formed simply by fronting.

Example 6	*fronting*
NNS	he have he have three alien?
NS	does he have three aliens?

Example 7	*inversion*
NNS	what she is doing?
NS	what is she doing?

Example 8	*insertion*
NNS	why he want this house?
NS	why does he want this house?

Additionally, it is argued that certain morphological changes, such as the past morpheme *"-ed"* or third person singular *"-s"*, might be non-salient to the learner (Gass & Selinker, 1994; Sato, 1990). In contrast, syntactic changes involved movement or additions of whole constituents and, for this reason, may have been more obvious to the learner. The following hypothesis was tested;

> *H5* Accuracy of recall will differ according to the type of change made in the recast utterance, such that syntactic changes will be recalled with greater accuracy than morphological changes.

Clearly redundancy, stress, intonation, pausing and pace may also make elements of structures more salient to learners (Larsen-Freeman & Long, 1991; Gass, 1997). It is, however, beyond the limits of this study to consider these factors here. Hypothesis 5 essentially concerns internally created salience (Sharwood Smith, 1991), that is, whether morphological or syntactic elements may be intrinsically more salient (i.e. more likely to be noticed by the learner) than others because of internal learning mechanisms.

3.2.6 Research questions 6 and 7 : use of recasts

The final two research questions dealt with the effect of noticing on subsequent production and short-term development and were addressed through qualitative analyses of the data.

> RQ6 To what extent do learners incorporate recasts of question forms in subsequent production?

> RQ7 To what extent do learners integrate recasts of question forms in delayed post- tests?

As discussed in the previous chapter, a number of studies have demonstrated that learners' interlanguage production may benefit from interaction on tasks with a NS, showing improvements in communication strategy (Gass & Varonis, 1994); increased control over structures (Nobuyoshi & Ellis, 1993); and possible destabilisation (Mackey, 1995; in press; Mackey & Philp, 1998).

Mackey and Philp (1998) suggested that although intensive recasts arguably provide learners with a larger database of forms, there was little evidence of this in terms of immediate incorporation in their study of 35 NNS over three sessions of NS-NNS task-based interaction. Others reported similar findings when repetition or modification of recasts were examined (Doughty, 1994; Oliver, 1994). Indeed many are sceptical that

immediate incorporation should be an expectation (Gass, 1990; Lightbown, 1998; Mackey & Philp, 1998).

While Mackey and Philp (1998) found little evidence for immediate incorporation, they nevertheless did find changes in the longer term. They reported that higher-level learners produced more questions at higher stages in delayed post-tests, suggesting that intensive recasts had a delayed effect on interlanguage development. Given this finding, it was important to investigate both immediate and delayed effects of the treatment. Changes to the learners' production of question forms were correlated with noticing of these forms in recasts provided during the treatment sessions. Changes occurring in the interlanguage production of learners in delayed post-tests were interpreted as integration of recasts.

3.3 *Summary of research questions and hypotheses*

This chapter has described the rationale for exploring noticing of recasts in task-based interaction by learners and the outcomes of noticing in short-term development. A summary of the research questions and hypotheses used in this study appear below in Table 3.1. This is followed by a summary of operationalisation of terms. The following chapter provides a detailed description of the methodology used to address the research questions and hypotheses.

Table 3.1. Summary of research questions and hypotheses

Research Question	Hypothesis
RQ1. Is ability to recall a given recast constrained by the level of the learner?	H1. Accuracy of recall is correlated with level of learner, such that the higher the level of the learner the greater the accuracy of recall (High > Intermediate > Low).
RQ2. Is ability to recall a given recast constrained by the type of question form?	H2. Learners will show a significantly higher percentage of correct recall for question forms that are within their level than for question forms that are beyond their level.
RQ3. Is ability to recall a given recast constrained by the length of the recast utterance?	H3. Accuracy of recall will be higher for shorter recasts than longer recasts.
RQ4. Is ability to recall a given recast constrained by the number of changes made?	H4. Recall will be more accurate the fewer the changes made in the recast utterance.
RQ5. Is ability to recall a given recast constrained by the type of change made in the recast?	H5. Accuracy of recall will differ according to the type of change made in the recast utterance, such that syntactic changes will be recalled with greater accuracy than morphological changes.
Qualitative Analysis	
RQ6. To what extent do learners incorporate recasts of question forms in subsequent production?	
RQ7. To what extent do learners integrate recasts of question forms in delayed post-tests?	

3.4 Definitions and measurements of terms

This section provides a brief summary of key terms used together with an explanation of how these terms were operationalised. Where the term has not been previously discussed in detail, it is elaborated upon here.

3.4.1 Second language development

Development was operationalised as increased production of questions at higher stages (see Mackey, 1995; Spada & Lightbown, 1993). Stages of question formation were identified according to the developmental framework proposed by Pienemann and Johnston (1987). This framework was initially based on research into the acquisition of German word order by adult language learners (Meisel et al., 1981). A fixed order of acquisition was proposed, with each stage within the six-stage sequence being contingent upon the previous stage. The fixed order was hypothesised to be a function of certain processing constraints which were common to all learners regardless of their first language (L1) or the language being learnt (L2). Such constraints were found to be predictive of an order of acquisition for question forms in ESL and are explained briefly in terms of the effects they have on question development (after Mackey, 1995, p. 24; see also Ellis, 1994b; Larsen-Freeman & Long, 1991; Pienemann & Johnston, 1987). Examples are given from the data in this study.

In the first stage, a learner produces single words and formulae, such as *"flower?", "what is this?" , "I don't know"* These formulae are chunks; elements within the chunk are unanalysed and inseparable. Examples of questions using formulae are:

NNS	What do you do for a living? Man?
NNS	What do you do your picture?

In the second stage the learner is able to produce fixed strings of elements, such as *"we go house?"* . Questions follow canonical word order, that is constituents are ordered according to meaning or information focus

rather than grammatical codes, and intonation is used to indicate an interrogative, for example:

NNS he is a business?
NNS he is angry?

In the third stage, the beginnings and ends of strings are able to be identified and separated by the learner, who can produce utterances such as *"yesterday we come here"* or *"we come here yesterday"*. Questions are now indicated by an initial question word, auxiliary or interrogative phrase fronting a string of elements, such as:

NNS is she has a dog?
NNS does she has a dog?
NNS why his face is like wondering?
NNS what they do now?

The fourth stage is marked by an ability to move elements from within the string of elements to the initial or final position in the string, that is to salient positions. This presupposes a recognition of classes of elements, that is, those that are moveable (e.g., subject and auxiliary) and those that are not. At this stage the learner may produce questions such as:

NNS Why is he disappointed?
NNS What is this?
NNS How long is he married?
NNS How many flowers are there?
NNS Is she carrying anything?
NNS Is he alone in the classroom?

In the fifth stage the learner is able to move elements not only from within the string to salient positions, but also to other positions internal to the string itself. This involves a recognition of different grammatical categories and the relationship between elements. At this stage, for example, a learner is able to invert subject and auxiliary in order to form a question, for example:

NNS Why do they want to live city?

NNS Where is he going?
NNS What is he doing now?
NNS What kind of song do they sing?

Finally, in the sixth stage, the learner is able to distinguish sub-strings of elements within a string and move them accordingly, such as subordinate clauses. In terms of question forms, this means the learner is able to cancel the inversion rule generated in the fifth stage as required by an embedded question in English, for example *"can you tell me what the time is?"*. Negative questions and tag questions are also included in this category:

NNS Why aren't there any bears?
NNS He is in the hospital, isn't he?

These six developmental stages are summarised in Table 3.2 (from Mackey, 1995), specific to question development in ESL. Some researchers (Lightbown & Spada, in press; Mackey, 1995; Spada & Lightbown, 1993) have noted that one difficulty with the Pienemann and Johnston model is that it is a gross measure of development and generally fails to capture gains made over a short term, such as occur in experimental studies. Within the stages certain structures have been distinguished from others, for example fronting of canonical word order in Stage 3 with *"do"* versus another word such as *"is"* (Spada & Lightbown, 1993), and in Stage 4, inversion with a pronoun but not a noun (Lightbown & Spada, in press). As the primary focus of this study is on noticing rather than interlanguage development, a breakdown of structures within stages is not discussed in detail here, however some reference will be made to development of various structures within stages in the qualitative analysis of the data in Chapters 6 and 7.

3.4.2 Level of the learner

Following Mackey (1995), the level of the learner was identified according to the Pienemann and Johnston framework (Pienemann & Johnston, 1987). A learner was defined as having attained a particular stage of

development, if he or she was able to produce at least two productive uses of two higher-level question forms on two different tasks (Mackey, 1995; and later used in Mackey & Philp, 1998). This was a more rigorous criterion than that used by earlier research (Pienemann & Johnston, 1987; Pienemann et al., 1988; Spada & Lightbown, 1993). The level of the learner was identified by performance on the pre-test and confirmed in the first treatment session.

3.4.3 Recast

Recasts rephrase the previous speaker's utterance "by changing one or more sentence components (subject, verb or object), while still referring to its central meanings" (Long, 1997, p. 434).

3.4.4 Noticing

Noticing was described by Robinson (1995b) as..."detection with awareness and rehearsal in short-term memory ... necessary to learning and the subsequent encoding in long-term memory (p. 318)." For the purposes of this study noticing was operationalised as the learners' detection of a recast utterance, encoded in short-term memory, such that it could be recalled in response to the interruption of an impromptu sound cue (two knocks on the table). In Example 9, below, the NNS was said to have noticed the recast because she was able to recall it in response to the sound cue.

Example 9	*IndoF*
NNS	what she is doing?
NS	what is she doing? =* *=
NNS	=what= what is she doing?

Table 3.2. Examples of question forms and developmental stages

From Mackey, A. (1995, p.66) based on Pienemann and Johnston (1987) and Pienemann, Johnston and Brindley (1988). (See also Lightbown & Spada, 1993; Spada & Lightbown, 1993)

Developmental Stage	Example	
Stage 2 SVO? Canonical word order with question intonation.	It's a monster? You have a cat?	Your cat is black? I draw a house here?
Stage 3 Fronting:Wh/Do/Q-word Direct questions with main verbs and some form of fronting.	Where the cats are? Do you have an animal?	What the cat doing in your picture? Does in this picture there is a cat?
Stage 4 Pseudo Inversion: Y/N, Cop. In y/n questions an auxiliary or modal is in sentence-initial position. In wh-questions the copula and the subject change positions.	(Y/N) Have you got a dog? (Cop) Where is the cat in your picture?	Have you drawn the cat?
Stage 5 Do/Aux 2nd Q-word->Aux/modal ->subj (main vb, etc) Auxiliary verbs and modals are placed in second position to Wh-q's (& Q-words) and before subject (applies only in main clauses/direct q's).	Why (Q) have (Aux) you (sub) left home? What do you have? Where does your cat sit? What have you got in your picture?	
Stage 6 Canc Inv, Neg Q,Tag Q Cancel Inv: Wh-q inversions are not present in relative clauses Neg Q: A negated form of do/aux is placed before the subject Tag Q: An aux verb & Pronoun are attached to end of main clause.	(Can Inv) Can you see what the time is? Can you tell me where he is? (Neg Q) Doesn't your cat look black? Haven't you seen a dog? (Tag Q) It's on the wall, isn't it?	

Methodology

CHAPTER 4

This chapter outlines the methodology used in this study. A description is given of the sample (4.1), the design of the study (4.3), the procedures (4.4) and the tasks (4.4.2). This is followed by an explanation of the data analysis (4.5), including the coding (4.5.2) and statistical analyses (4.6).

4.1 Sample

4.1.1 Recruitment and follow-up of subjects

The sample of ESL learners was composed of overseas students enrolled in six to eight week intensive English courses at the English Language Centre (ELC), University of Tasmania in 1996. Participation in the project was entirely voluntary; however the majority of students at the Centre chose to be involved, attracted by the opportunity for one-on-one interaction with a native speaker. The sessions were described as "conversation practice" with a native speaker. Students knew that it was a dissertation project researching second language learning and gave written permission for the data to be used in this study. This project was approved by the University of Tasmania Ethics Committee and complied with the laws of the State.

As the researcher had been involved at the ELC as a part-time teacher and had assisted with some excursions, she was well known to the staff. The other teachers were positive about the project and assisted in recruiting students and ensuring their commitment throughout the six weeks.

At the conclusion of their involvement in the study, the students were given an explanation of the purpose of the research and were able to ask any questions they had about the study. Transcripts of post-tests were

made available for them to discuss with their teachers and they were provided with feedback on their performance if they desired it.

Overall commitment by the students was very good; 33 subjects completed the project, in addition to six students who were lost through attrition. Where students were absent once, they attended a make-up session as soon as they returned to classes. In some cases, this was not possible. Of a total of 433 sessions, 13 sessions were lost owing to recording failure or absenteeism.

The total population of students enrolled at the ELC at any one time was small (N = 30-48); generally there were only three to four classes, each at different levels, with 10-12 students per class. In order to include sufficient numbers of participants, data collections were carried out twice in 1996.

4.1.2 Teachers and effect of instruction

The fact that the data collection took place over one year, involving two "batches" of students was held to be an advantage in controlling teacher effect. All classes had three to five teachers, and some teachers taught sessions in more than one class. Materials were not based on any one textbook for any of the classes. All teachers were experienced, well-qualified ESL teachers who taught "communicatively", with an emphasis on using the target-language for everyday needs. Excursions and outdoor activities were frequent. Grammar was sometimes taught explicitly. Co-ordination between teachers was maintained through weekly meetings in which teachers reported to each other on their syllabus for the week. Records were kept by the school of all materials used. During the period of each data collection, question forms per se were not a topic of instruction. Most of the teachers at the Centre were the same throughout the year but did not necessarily teach the same class from month to month. In this way specific teacher effect was felt to be unlikely.

4.1.3 First language and gender of subjects as variables

Numbers were constrained by the availability of willing students at the different levels. For this reason, first language (L1) and gender could not be controlled or systematically manipulated by the researcher. In any case, L1 is claimed not to be a factor affecting order of acquisition in the model of development used, although it may affect rate of development (Pienemann & Johnston, 1987) and the occurrence of substages or "side" stages in the order of development[1] (Wode, 1981; Zobl, 1979; see also Lightbown & Spada, in press). In a post-hoc analysis, albeit also with small numbers, Mackey (1995:143) found little relationship between interlanguage change and L1. In the present study, mixed L1s were included to randomise for this factor. However, research using NNS-NNS pairs has shown an effect for both language (Duff, 1986; Plough & Gass, 1993) and gender (Pica, Holliday, Lewis, Berducci, & Newman, 1991) on provision of negotiation and quantity and quality of feedback and production on tasks.

4.1.4 Subjects

A total of 33 students took part in the study. Of these, 18 were female and 15 were male. Japanese and Korean were the main first languages (L1) spoken, followed by Thai, Cantonese, Russian and Indonesian. Students ranged in their ability to speak English and were assigned to one of three levels: High, Intermediate (Inter) and Low. Classification of subjects in terms of the three levels is discussed below (4.2). A summary of subject characteristics is given in Table 4.1. A more detailed table, subject by subject, appears in Appendix 4.1. As seen in the Appendix, subjects in the three groups differed in their level of previous education and, correspondingly, in their expectations for the future. Those in the High group tended to be older, have a higher level of education and have more definite plans for their future than those in the Low group.

[1] I am grateful to Patsy Lightbown for pointing this out to me.

All subjects were aged between 17 and 30. The majority had arrived in Australia within three months of their involvement in the study. Subjects in the Low group had been in Australia less than a month.

Table 4.1. Summary of subjects

Data Collection	Low Group	Inter Group	High Group	n	L1
Mar/Apr	3	7	8	18	Korean (9), Thai (4), Japanese (2), Cantonese (2), Russian (1)
May/Jun	4	4	7	15	Japanese (9), Korean (5) Indonesian (1)
Total	7	11	15	33	Korean (14), Japanese (11), Thai (4), Other (4)

4.2 Group assignment

All subjects participated in the same treatment sessions. For the purposes of analysis, they were later assigned to one of three groups: Low, Intermediate or High according to their performance on a pre-test and performance in the first treatment session. Group assignment was based on learners' production of particular question forms which were the structures targeted in the study. As order of acquisition for ESL question formation had been identified through previous research (Pienemann & Johnston, 1987; Pienemann et al., 1988; Pienemann & Mackey, 1993; Spada & Lightbown, 1993), learners' production of questions was held to be a reliable indicator of development (Mackey, 1995).

Learners fell within four of the six stages of development presented by Pienemann and colleagues (Pienemann & Johnston, 1987; Pienemann et al., 1988). These are shown in Table 4.2.

Table 4.2. Summary of stages reached by subjects in pre--test performance

(adapted from Mackey, 1995; see Pienemann & Johnston, 1987; Lightbown & Spada, 1993)

(See Chapter 3, Table 3.2 for detailed presentation of stages)

Stage	Description	Examples
Stage 2	**Use of rising intonation and canonical word order to indicate a question**	*She is happy?* *Your picture have cat?*
Stage 3	**Fronting of canonical word order** by a question word eg *wh* or *aux*	*Where the cat is?* *Do you have cat?*
Stage 4	**Inversion in yes/no questions,** inversion of copula in *wh-* questions.	*Where is the cat?* *Is cat purple?*
Stage 5	**Inversion in *wh-* questions** (auxiliary and *do)*	*What does the cat doing?* *Where is he going?*

Although Pienemann and his colleagues' model of developmental stages in ESL acquisition included other features such as morphological and word order features, questions alone are used here, as they are those targeted in the study and those elicited in the tasks.

Learners were assessed as being at a certain level, if they produced at least two *productive* uses of question types of a particular stage in different contexts (Mackey, 1995; see also Pienemann & Johnston, 1987; Pienemann et al., 1988; Spada & Lightbown, 1993). It is important to note that the learner was required to use the form productively (Pienemann & Johnston, 1987:249). That is, he or she was able to generate various forms of the same question type such as *" is it his book?", "are they yellow?",* and did not simply repeat a formula such as *" is it book?", "is it yellow?", "is it big house on left?".* Differences between questions of the same type are identified by a lexical or morphological difference in the verb. Production of questions both in the pre-test and on the first treatment session was used to assess level in order to ensure productive usage was being noted. Subjects were first assigned to a group on the basis of their production of questions in the pre-test. This was then checked against their performance in the first treatment session which took place on the next class day.

Those assigned to the Low group produced two or more Stages 2 and 3 questions, but no questions at higher stages in both the pre-test and the first treatment session. Those in the Intermediate group produced two or more questions at Stages 4 and 5, but with difficulty (i.e., IL forms predominated) in both the pre-test and the first treatment session. Those in the High group produced two or more questions at Stage 5 with consistent accuracy (i.e., TL forms pre-dominated) in both the pre-test and the first treatment session. Examples of subjects' pre-test performance and subsequent assignment are provided in Appendices 4.2 and 4.1 respectively. Not surprisingly, groupings roughly corresponded to class groups of the ELC: 6 of the 7 subjects in the Low group came from three beginner level classes, 7 of the 11 in the Intermediate group came from the two intermediate level classes and 10 of 15 in the High group came from the two advanced level classes. As noted above, the fact that the sample came from a number of classes, each with a number of teachers, meant teacher effect was unlikely.

4.3. Task-based interaction sessions

4.3.1 Timing

Each session took approximately 20 minutes. For the first data collection, subjects were withdrawn mid-morning, during class time. For the second data collection, in response to participant request, most sessions occurred mid-afternoon, after class with one session a week occurring during class time. No difference in performance was noted between sessions occurring during class time and those occurring after class.[2]

[2] Differences between sessions taking place during class time and after class time was assessed firstly by the report of the researchers taking the sessions and then by a comparison of percentage of correct recall for those learners who experienced both in-class and after-class sessions.

4.3.2 NS facilitators

Tasks and facilitators were the same for both data collections. Three NS facilitators, aged 25-35, one male and two female, acted as partners in the dyads, including the researcher. The male facilitator had no teaching experience, no training in linguistics and little contact with non-native speakers of English as a second language (NNS). The second facilitator had a little ESL teaching experience as a tutor and had NNS friends. The third facilitator was an experienced ESL teacher, with training in linguistics and many NNS friends. The disparity between the facilitators was balanced to some extent by having subjects randomly assigned to facilitators and rotated, so that all subjects were paired with all facilitators.[3] The order for the tasks used in treatment sessions was random.

4.4 Design of the study

The design of the study is based on Mackey (1995; in press, see also later use by Mackey & Philp, 1998). Hence the majority of tasks used were the same as those used in these earlier studies. A major difference, however, was the length of the treatment which, in this study, consisted of 5 x 20-minute sessions over two weeks (100 minutes) for each learner, but in the previous studies had consisted of 3 x 20-minute sessions over one week (60 minutes). The treatment was lengthened in order to increase the number of recasts and to provide more intensive input to subjects. The advantage of repeating the design of these two studies was that they provided a pre-trialled model for both task and design. These studies demonstrated the use of tasks for promoting interaction, appropriate use of recasts and elicitation of question forms. This ensured that for the present study, as the link between intensive recasts and development had already been tested, the focus of the research was on noticing. In a sense

[3] Post-hoc analysis of tokens of recasts provided in each session by each facilitator revealed no significant difference between facilitators.

this study provides the sequel to the previous studies which had asked "Does interaction lead to development?", by asking "How?".

A second difference was that, as the primary focus of the study was on noticing, that is, on how interaction leads to development, there was no control group. As noted above, the effects of recasts on interlanguage development, using comparable tasks, have been reported elsewhere (Mackey & Philp, 1998).

Both the test and treatment sessions involved paired NS-NNS task-based interaction and lasted approximately 20 minutes. The study took place over six weeks and consisted of a pre-test session, followed by five treatment sessions over two weeks and a post-test session, followed by one post-test session one week later and a final post-test session two weeks after this. This is shown in Table 4.3.

Table 4.3. Research Design

Week 1	Pre-test
Week 2	Treatment Sessions X 5
Week 3	Post-test 1
Week 4	Post-test 2
Week 6	Post-test 3

4.4.1 Numbers in groups

The numbers of members of each group were dictated by the availability of students; thus numbers in the High, Intermediate and Low groups varied. However, this was not considered problematic as, with the exception of the first research question, questions involved individual performance in the treatment sessions. The third focus of the study primarily concerned those learners who were at a stage of readiness to acquire the question forms provided in recasts and those learners who were already able to produce these forms; that is, learners in the Intermediate and High groups. Previous research suggested that it is higher-level learners who demonstrate most benefit from interactional

modifications in the short term (Mackey, 1995; Mackey & Philp, 1998). The Low group was primarily included in the study in order to assess the effects of the level of learners on noticing recasts (RQ1).

4.5 Procedure

4.5.1 Pre- and post-test sessions

Pre- and post-test sessions were used to assess the NNS' short-term development following interaction with intensive recasts. Test sessions consisted of 20-minute NS-NNS task-based interaction. Two tasks were used in the test sessions: a "spot-the-difference" task and a story-completion task. In the final post-test session, an additional spot-the-difference task was added to ensure a suitable number of question forms was elicited for analysis. A summary of the tasks used is given in Table 4.4.

Table 4.4. Tasks used for test sessions

TASK TYPE	Pre-test	Post-test 1 *	Post-test 2 *	Post-test 3 *
spot the difference	park	aliens	police car	objects / zoo
story completion	dinner story *an important dinner party ends in disarray*	lost suitcase *a tourist loses his suitcase but meets someone new*	stolen wallet *a wallet is stolen and regained unexpectedly*	dinner story 2 *a hotel manager is embarrassed by an April fools joke*

* Post-tests were administered one day, one week and three weeks after the final treatment session.

Mackey (1995) has noted the importance of using a variety of tasks in order to give learners "fresh starts" in each task and to allow for targeted forms to be elicited in different contexts. The tasks used were similar to those used in treatment sessions and were designed to elicit question forms in order to assess learners' production of the targeted forms. Performance on post-tests was compared to recall-performance during treatment. NS facilitators were instructed to avoid the use of questions themselves and to avoid the use of correction or recasts. All subjects received the same tasks for each test.

4.5.2 Treatment sessions

Treatment sessions, like the post-tests, involved NS-NNS task-based interaction, with a story-completion task and a picture-drawing task, and are described below. All tasks used in the sessions were based on those developed at the Language Acquisition Research Centre (LARC), University of Sydney, with funding from Language Australia. The 10 LARC tasks used in this study had been trialled in previous studies (Mackey, 1995; Mackey & Philp, 1998; Mackey, Pienemann, & Thornton, 1991; Pienemann & Mackey, 1993) and were chosen for their elicitation of question forms. An additional set of nine examples of the task types was developed by Philp (1996). Samples of treatment tasks and related transcripts appear in Appendix 4.3 and 4.4 respectively.

During the interaction, subjects were provided with recasts of their non-target-like utterances. To do this, the subjects were unexpectedly interrupted following each recast and cued to recall the NS's previous utterance (i.e., the recast).

4.5.3 Training of faciliators

The protocol for treatment sessions was developed through piloting of the test measurements and use of recall two months prior to the first data collection. Piloting took place at the ELC with a group of six learners; three high-level learners and three intermediate-level learners.

Following Mackey (1995), prior to the sessions, facilitators were trained in the task protocol by reading through the instructions and sample transcripts and by role plays, to a level of high consistency. The facilitators were instructed to:

a) carry out the tasks with each subject in 20 minutes;

b) elicit questions forms as much as possible, but avoid using questions;

c) recast any non-TL utterance given by the NNS, especially question forms;

d) after each recast, interrupt the NNS' next turn by knocking on the table.

When the NS knocked on the table, this was a cue for the subject to recall the previous utterance. An example from a treatment transcript is given below.

Example 1 *ThaiF*

NNS	what design his hat?
NS	what design is his hat?=* *=
NNS	=mm= what design is his hat?

The knocks occurred after the NS facilitator had completed her turn and usually once the learner had already begun the next turn. It is important to note that the recall cue occurred *after* the recast and was unanticipated by the learner. The function of the recall was to determine if the learner happened to notice the TL form of the recast utterance while engaged in task-based interaction. In addition, the learners received recasts of forms other than question forms. As for recasts of targeted forms, these recasts were also followed by knocks. This was done so that learners would not identify quesions as the focus of the study.

4.5.4 Treatment protocol

Each treatment session consisted of three tasks: a warm-up task, a story-completion task and a picture-drawing task.

The warm-up task involved the serial recall of numbers. Subjects were asked to listen to the NS facilitator read a string of random numbers. After the sound of two knocks, they were expected to recall the last two numbers that they heard. This warm-up task was used to train subjects to recall the facilitator's previous utterance in response to a knocking sound. The knocking sound was made by the facilitator who knocked

twice on the table. An example of a number string with points for recall is: "20, 9, 9, * * 11, 21, 3, 5 * *, 32, 18, 1, 66, 7 * * ". All subjects were able to complete this simple task without difficulty.

The second task was a story-completion task. Subjects were presented with a sequence of pictures which portrayed a story. Pictures were shown in sequence, one by one. As each picture was shown, subjects could ask any questions to elicit the story behind the pictures. Subjects were instructed to repeat their partners' previous utterance in response to the sound of two knocks occurring at any point during the task. An example of the instructions[4] given is;

> *I have a set of pictures. The pictures tell a story. Ask me any questions and I'll tell you the story. Ask me questions and I'll tell you the story behind the pictures. Also, if you hear a knock, like this (faciliator knocks twice) then say the last thing I said, OK?*

The third task was a picture-drawing task. Subjects were required to ask questions to discover the contents of a hidden picture, held by the facilitator. The subjects had to draw their picture to resemble as closely as possible the objects and position of objects in the hidden picture, in response to the answers to their questions. Subjects were instructed to repeat their partners' previous utterance in response to the sound of a knock at any point during the task. An example of the instructions given is;

> *I have a picture. Here's a paper and a pen. You have to draw my picture. You can't see my picture but you can ask me any questions and I'll tell you what's in my picture. Ask me questions to find out what's in my picture. Also, if you hear a knock, like this [facilitator knocks twice] then say the last thing I said, OK?*

[4] Task instructions are based on Mackey (1994a).

Learners varied in how meticulous they were in drawing the pictures, and so differed in the degree of detail drawn. The importance of the task, as far as the facilitators were concerned, was not that the drawing be completed, but that learners asked as many questions as possible within the 20-minute session. Appendix 4.4 provides sample transcripts of the treatment sessions. Table 4.5 provides a summary of the tasks used in treatment sessions.

Table 4.5. Tasks used for treatment sessions

Task type	A	B	C	D	E
Story completion	Rescue *a 6yr old girl escapes her room to find herself 16 floors above ground.*	Auction *a signwriter delivers an auction sign to the wrong house.*	Zoo *a young girl's birthday begins and ends in tears*	Business deal *a shady deal involves poisoning and blackmail*	Baby name *a father rushes to see his newborn baby and returns downhearted.*
Picture drawing	Farm scene	3 people	A garden	A classroom	10 objects

4.5.5 Tasks

All treatment tasks were one-way communicative tasks; that is, tasks in which the missing information was held by one person, the NS facilitator. The tasks used in the test sessions included both one-way and two-way tasks. Research has demonstrated that one-way tasks and two-way tasks vary in the degree to which they provide opportunities for negotiation (Doughty & Pica, 1986; Pica & Doughty, 1988; Pica et al., 1987) and recasts (Oliver, 1995).

However, for the purposes of this study, the crucial requirement was the extent to which the tasks elicited question forms. The task types were chosen on this basis. All three tasks used in the study were specifically designed to ensure elicitation of the targeted forms and to constrain learners' production of particular question form types (Mackey, 1994a; 1994b). Only the NNS initiated questions, thus avoiding any modelling of question forms by the NS facilitator. In general the story-completion tasks tended to elicit Stage 4 and 5 questions such as *"what is she doing?"*,

"why is he unhappy?" while picture-drawing and spot-the-difference tasks elicited Stage 3 and 4 questions such as *"where is it?", "are there any trees?", "do you have alien?"*. An innovation of this study was the successful elicitation of Stage 6 questions, which had been particularly difficult in previous studies (Mackey, 1995). Two of the new story-completion tasks used elicited such questions as *"why didn't she know?", "why isn't he there?"*.

4.5.6 Post-hoc questionnaire

After the final post-test, subjects were given a questionnaire to fill out in their L1. [5] It was decided to provide the questionnaire in the L1 so as to reduce the possibility of misunderstandings in answers. The questionnaire is included in Appendix 4.5. It contained 10 questions and was designed to take 5-10 minutes to complete. It asked students about their enjoyment of the sessions, whether they felt they had learnt anything or found anything helpful, whether they thought there was any particular focus in the sessions and why they thought the signal "knock knock" was used in the activities.

4.6 Data analysis

4.6.1 Transcription

All sessions were audio-recorded and transcribed using standard English orthography. The majority of the transcription and coding was completed by the researcher, however approximately 10 hours of data were transcribed by two research assistants and double-checked by the researcher to ensure accuracy. Inter-rater reliability on all words

5 The Russian speaker and the Indonesian speaker received questionnaires in English as native speakers of these languages were not available to translate. These speakers had no difficulty responding to the questionnaire. All other subjects received questionnaires written in their L1. Questionnaires and responses were translated by L1 native and near-native speakers.

transcribed for one transcript was 96%. In Appendix 4.6, details of the transcriptions and transcription conventions are provided.

There were 433 sessions of 20 minutes each. Because of the size of the data set, complete transcriptions were not performed on all the data sessions. Complete transcripts were made for half the test sessions and a random sample of the treatment sessions. These transcriptions, in which every word, hesitation and false start were included, took approximately five hours for every hour of data to transcribe. For the remainder of the data, only question forms, recast episodes, turns which included scaffolding and any "interesting exchanges" were transcribed. These transcriptions included: all question forms, however fragmentary, provided by the learner; any question forms provided by the NS; and any of the NS's utterances which the learner then incorporated, for example by using the same vocabulary or syntax. Interesting exchanges included all negotiation sequences. Recast episodes included a trigger utterance, the recast utterance and the response of the learner, as explained in detail below.

4.6.2 Coding

The researcher coded all transcripts and double-coded approximately 15 % of all data at least six months after the initial coding. The intra-rater [6]reliability on coding of accuracy of recall, based on percentage agreement of 135 recasts from 10 random transcripts from learners of all levels, was 99.92%. All questions produced in treatment sessions and in pre- and post-test data were coded according to stages of question development. The intra-rater reliability on coding of NNS question forms, based on percentage agreement of 135 questions from five random transcripts from

[6] The majority of the data was coded by the researcher. Although experimenter bias is a risk here, the procedures used conform to those of other studies and were limited by data collection constraints. The high agreement obtained for intra-rater reliability in a 6 month comparison provides an indication of the reliability of the analysis (see Seliger & Shohamy, 1989).

test data from learners of all levels, was 91.11%. Intra-rater reliability of question forms in NS recasts, based on percentage agreement of 96 questions from five random transcripts from treatment sessions, was 100%.

Additionally, half the test data and approximately a third of the treatment transcripts were double-coded by six assistants. A test of inter-rater reliability (IRR) between three coders on coding of accuracy of recall in treatment sessions was based on 50 recasts from four random transcripts from learners of all levels. IRR was 91%. IRR between three coders and the researcher on coding NNS question forms was based on average percentage agreement of 100 questions from three random transcripts from test and treatment data. IRR was 90.83%.

Once coded, all codes were entered into a statistical analysis software package, SPSS 6.1, and checked against original coding sheets by the researcher. A detailed description of the coding follows.

As noticing was operationalised as accuracy of recall, this was coded in the transcripts. All recasts following a non-target-like "trigger" utterance and followed by a recall utterance were coded. These three turns were termed an "episode", as shown in Example 2 below.

Example 2 *Recast episode*

Trigger utterance	NNS	why he is very unhappy?
Recast utterance	NS	why is he very unhappy? = * * =
Recall utterance	NNS	=yeah= why is very unhappy?

Each of these three turns was coded in particular ways:

a) The accuracy of the recall was coded;

b) The question forms used in the trigger, the recast and the recall were coded;

c) The length of the recast utterance was noted;

d) The type of difference between the trigger and the recast was coded as well as the number of differences between the two.

These coding categories are demonstrated below.

a) Accuracy of the recall

Recall utterances were coded according to whether recasts were exactly recalled, modified or not recalled.

i. Correct recall

In many cases the learner was able to recall the recast utterance exactly, as in Example 3.

Example 3

NNS	is it his wife have some problem?
NS	does his wife have some problem? = * * =
NNS	=problem= does his wife have some problem?

Another response was for the learner to repeat the recast utterance almost exactly but some unrelated errors, not pertinent to the question form, remained. In Example 4 below, the NNS noticed the inversion of the auxiliary and noun but did not recall the added article:

Example 4

NNS	so what happened in the end what doctor is doing now?
NS	what is the doctor doing?
NNS	yes * * what what is_doctor doing?

Both of these responses were coded as correct recall.

ii. Modified recall

A second type of response was for the learner to modify the recast. In this case, the learner did not correctly recall the recast utterance; however the recall involved a modification of the original trigger utterance. In the following example, subject and auxiliary were inverted in the recast and in the recall the learner omitted the subject.

Example 5

NNS	why he is very unhappy?
NS	why is he very unhappy? = * * =
NNS	=yeah= why is_very unhappy?

iii. Failed recall

Thirdly, the learner could fail to recall the recast utterance correctly. In this case, although some slight changes might be made, these involved unrelated errors only, not pertinent to the question form, such as the addition of an article.

Example 6

NNS	pond uh 2 ponds is uh where is two ponds?
NS	where are the two ponds? = * * =
NNS	=yeah= where is the the two ponds?

Included in this category were times when the learner did not recall the recast at all. In this case the learner repeated either the trigger utterance or simply failed to respond at all.

Example 7a

NNS	why why did he feeling sad?
NS	why is he feeling sad? = * * =
NNS	=yeah= why did he feeling sad?

Example 7b

NNS	what does he thinking about?
NS	what's he thinking about? * *
NNS	[laughs]

In summary, recall utterances were coded as one of three responses: correct recall, modified recall, and failed recall.

b) Coding categories: question forms

Question forms were the focus of learner development. Hence, each utterance within an episode (i.e., the trigger, recast and recall utterance), was coded according to the question type used. Although there were

recasts of utterances which were not questions, these were ignored for the purposes of this study. Question types were identified according to developmental stage (see Table 4.2 above), as presented by Pienemann & Johnston (1987). For convenience, question forms belonging to Stage 2 are labelled Q2 forms, to Stage 3 as Q3 forms and so on.

c) Coding categories: length

A morpheme count was used to characterize the length of the utterance. Short recasts such as *"what is it?"*, while being beyond the developmental level of the learners, might nevertheless be recalled by them with little difficulty because of their short length.

As noted in Chapters 2 and 3, the issue of how many items may be stored in auditory memory is a complex one, depending on speech rate (Hitch, Halliday & Littler, 1984; Nicolson, 1981; cited in Baddeley, 1996), length and order of words (Baddeley et al. 1975; Cowan et al., 1992) and to other factors such as task type (Cowan, 1995). Cowan (1995:98) noted that while earlier research suggested seven chunks may be stored (Miller 1956), later research suggested that an unattended item span may be as few as three items. In SLA research, the number of items in itself is problematic in that learners may store chunks such as *"what do you"* and *"how many"* as single items. With these factors in mind, the morpheme count is intended as a general estimate only. Examples of short and long recasts are given below.

Example 8 Length of recast

a. short:

NNS what kind of ah thing ah what is they export to another country?

NS what do they export?

b. long:

NNS is he feeling good concerted?

NS is he feeling it's a good contract?

d) Coding categories: number of changes

As a measure of the degree of difference between the recast utterance and the trigger utterance, the number of changes between the two was counted. Differences were coded according to whether there was only one change, as in Example 9:

Example 9 *One change*

NNS	why he is very unhappy?
NS	why is he very unhappy?

or more than one change, as seen in Examples 10 and 11. In the latter case, changes were multiple.

Example 10 *Two changes*

NNS	what does she wear?
NS	what is she wearing?

Example 11 *Multiple changes*

NNS	are there has some tree?
NS	are there any trees?

A number of studies researching the effectiveness of recasts in FLA and SLA have considered whether recasts were more likely to be provided after single errors or multiple errors (Bohannon & Stanowicz, 1988; Doughty, 1993; Farrar, 1992). These studies suggested that if recasts were too different to the learner's original utterance, they were unlikely to be imitated, being too far removed from this first attempt (Long, 1997). This coding allows investigation of the relationship between noticing and number of errors.

e) Coding categories: type of changes

RQ5 addresses the types of changes between the recast utterance and the trigger utterance. While Table 4.2 describes the type of question forms produced, it is also important to consider how the question form produced by the learner differed from that produced by the NS in the recast turn. Four categories were identified as a type of change: syntactic; morphological; fragment; unrelated. These are summarised in Figure 4.1.

at the end of this section. The categories were generated by a description of episodes from the treatment transcripts. The categories given are not exhaustive, but aim to characterise some of the changes. The divisions reflect the focus of the study on morphosyntactic changes in recasts.

i. Syntactic changes

Syntactic changes involved the movement of constituents within the recast utterance. Syntactic changes involved one of three possible types of change: inversion, insertion or fronting.

a) Inversion describes a change in which a higher stage of question form is provided in the recast through reversing the position of two constituents. In Example 12, the recast is a Stage 4 question form, in which the subject and copula are inverted. Example 13, a Stage 3 question, is recast as a Stage 5 question form through inversion.

Example 12

NNS	he is very unhappy?
NS	is he very unhappy?

Example 13

NNS	why they are going?
NS	why are they going?

b) Insertion involves a change in the question form through the addition of an argument internally, for example a missing subject or auxiliary (including required morphology). In Example 14, the recast provides both the auxiliary and the morphology of the verb.

Example 14

NNS	what doctor say?
NS	what is the doctor saying?

In Example 15, the recast demonstrates the position of the subject.

Example 15.

NNS	what does brief= what does mean?
NS	what does briefcase mean?

c) Fronting describes a change which occurs at the beginning of the recast, for example the addition of a question word placed at the front of canonical word order.

Example 16

NNS	he go to hospital isn't it?
NS	did he go to the hospital?

These particular differences were singled out on the basis of descriptions of negotiation and their effect on language (Pica, 1992b). Pica (1994), for example, noted that segmentation, fronting and rephrasal might lead to salience of some forms.

Further, the processing constraints (Meisel et al., 1981; Pienemann, 1984) which are argued to realise the order of acquisition of question forms (Pienemann & Johnston, 1987), (as described in section 2.4.1), may impact upon these differences. Fronting, for example, may make the difference between a Stage 2 and a Stage 3 question form more salient to the learner.

ii. Morphological changes

Morphological changes affect verb conjugations. These include substitution of the auxiliary and morphological changes to the auxiliary or verb as seen below. Changes to the morphology of the noun, such as plural *"s "*, are not included here.

a) *Substitution* refers specifically to the change of auxiliary. The stage of question form remains the same. In Example 18, the change of auxiliary also affects a morpheme of the verb.

Example 17

NNS	is it his wife have some problem?
NS	does his wife have some problem?

Example 18

NNS	what does she wear?
NS	what is she wearing?

b) *Aux/verb* here refers to a morphological change either to the auxiliary or main verb. The question form remains the same.

Example 19

NNS	why is she cry?
NS	why is she crying?

Example 20

NNS	how many children does she has?
NS	how many children does she have?

iii. Fragment changes

This type of change identifies a recast which represents a total rephrasal of the learner's question form. A full question form may be provided following a fragment or single word trigger utterance, as in Example 21 or a completely different question form may be provided in the recast, as seen in Example 22.

Example 21

NNS	any tree?
NS	are there any trees?

Example 22

NNS	do you know what's important thingss mm for her hus mm wife?
NS	do I know what it's about?

iv. Unrelated changes

Unrelated changes are those extrinsic to the question form itself, which remains the same, such as a grammatical changes (e.g., to a pronoun or article), as seen in Examples 23 and 24 below or lexical or phonological changes.

Example 23

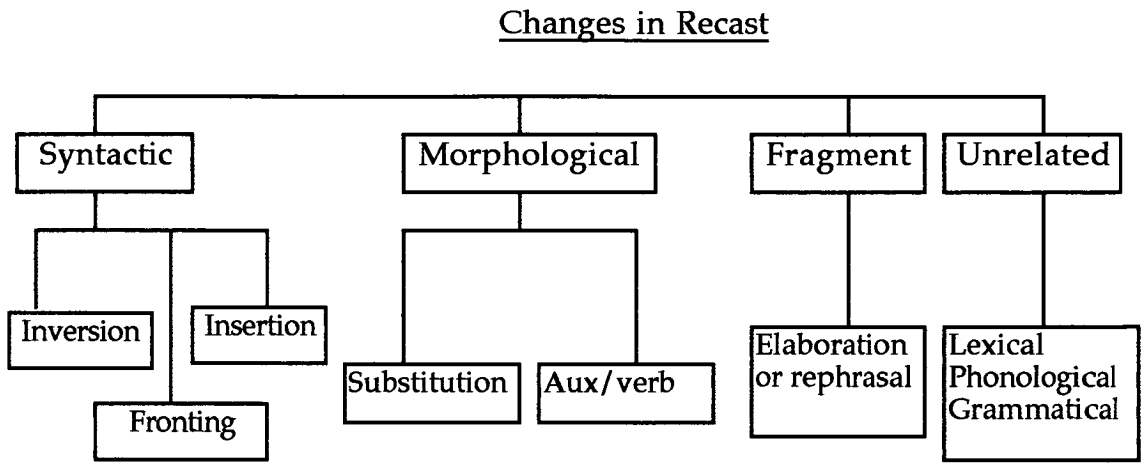
NNS	is it narcot drug contract?
NS	is it a drug contract?

Example 24

NNS	is he alone in the classroom?
NS	is she alone?

This completes the description of coding categories. A summary of the coding of the data is provided in Figure 4.1. Each box represents one coding category.

Figure 4.1. Summary of coding categories used, showing hierachy of codes



The following section details the analysis used in the study.

4.7 Analysis

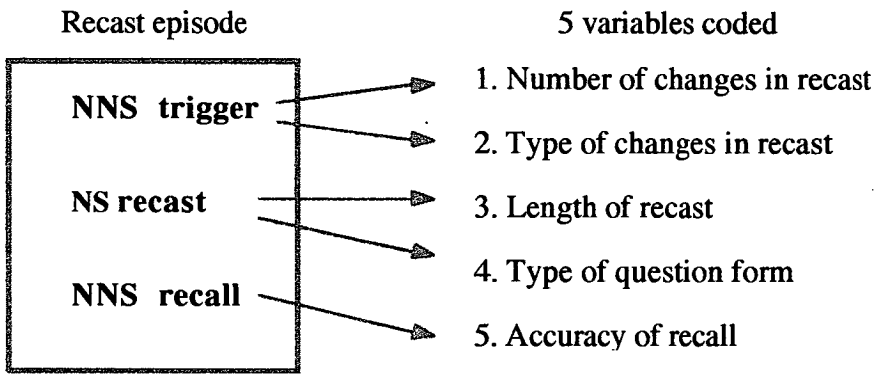
A statistical analysis of the data was carried out using SPSS 6.1 on a Macintosh computer. In addition to descriptive statistics in which the number and type of recasts provided to each group were detailed, correlations between main variables were also computed. In order to test the research hypotheses, totals of all recall episodes were computed and means given for each learner and then for the three groups. One-way Analysis of Variance (ANOVA) with Contrasts and *t*-tests were then carried out to test the hypotheses. ANOVA was used to determine differences between groups, while *t*-tests for paired samples were used to compare accuracy of recall with each variable for each individual group.

Where numbers were small, two non-parametric tests were used: Chi-square and Wilcoxon Matched-pairs test. The rationale for the use of each test is explained in further detail in the following chapter.

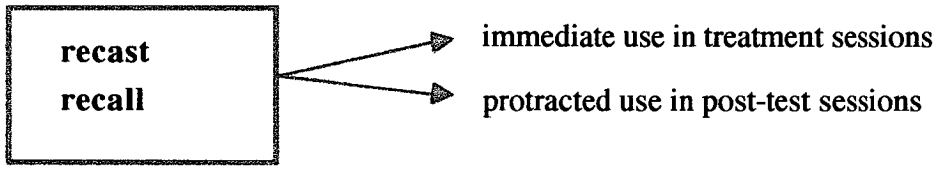
A qualitative analysis of a subset of the data was carried out in which the pre- test, post-tests and treatment sessions of three learners were examined. The learners were selected initially on the basis of level and L1, so that each group and each of the more common L1 groups in the study are represented. Secondly, selection was made on the basis of performance. They were not extraordinary students: they were in the mid-range for their group in terms of their class performance and their pre-test performance in this study. Transcripts were investigated for recall of recasts and subsequent incorporation of recasts within treatment sessions. Integration of forms that had appeared in recall episodes were examined in the post-test data.

Figure 4.2. Overview of analysis

1. Analysis of noticing of recasts (treatment session data)



2. Analysis of use of noticing (All data)



Pre-test compared to Post-test 1
Post-test 2
Post-test 3
production of question forms (Q3, Q4, Q5)

Results

CHAPTER 5

5.0 Introduction

This chapter presents the results of the quantitative analysis of the data and consists of two parts:

a) Noticing of recasts by learners;

   5.1 General description of recall episodes,

   5.2 Results of hypothesis testing,

b) The effects of noticing on development of question forms;

   5.3 Analysis of pre- and post-test data.

Sections 5.1 and 5.2 deal with the question " Do learners notice recasts in the context of task-based interaction?", where noticing was measured as learners' cued immediate recall of a recast. In these sections, data from the treatment sessions are analysed. First, a general description of the number and type of recasts provided to learners is given (5.1) as a picture of what occurred during the treatment sessions. This description is followed by the results of hypothesis testing (5.2), which reported on the noticing of recasts by learners, as measured by accuracy of recall of these recasts. The effects of the following variables on recall are assessed:

a) the level of the learner;
b) the type of question form in the recast;
c) the length of the recast utterance;
d) the number of changes in the recast to the learner's original utterance;
e) the type of changes made in the recast.

Section 5.3 of this chapter deals with the question "What effect does noticing have on interlanguage change?" This section reports on the effects of noticing on learners' short-term development of question forms through an examination of pre- and post-test data. All data are discussed qualitatively in Chapter 6.

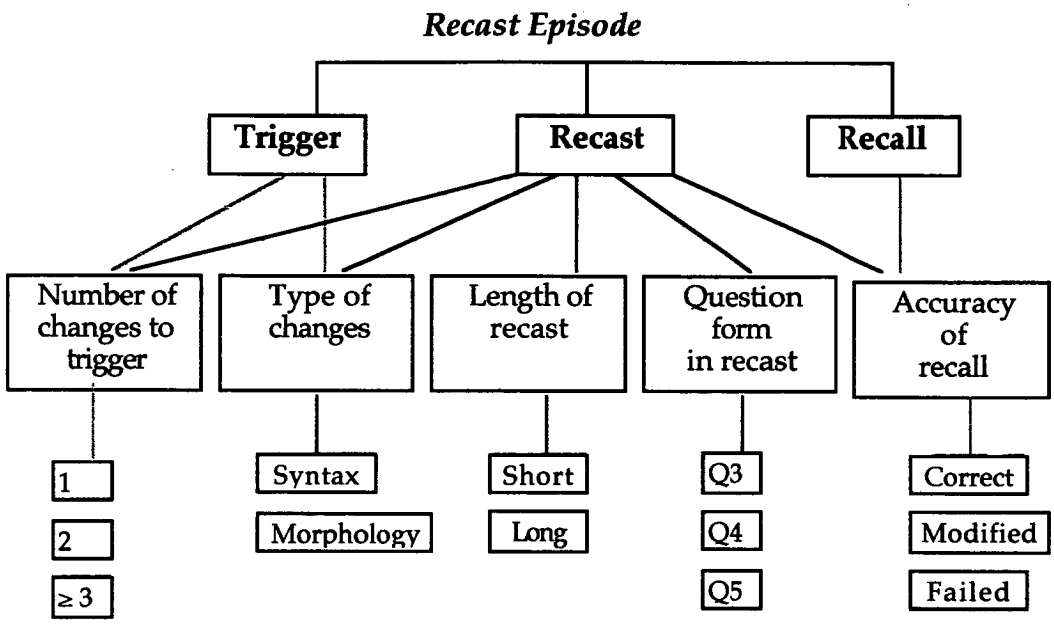
5. 1 Descriptive statistics of treatment sessions

Treatment-session data are first characterised briefly through a description of the following factors, which relate to the five variables tested:

a) the number of recall episodes provided to each group (High, Intermediate, Low);
b) the types of question forms recast;
c) the length of the recasts;
d) the number of changes made in the recasts;
e) the types of changes made in the recasts.

A summary of the analysis carried out on the data appeared in the previous chapter and is repeated here in Figure 5.1 in a condensed format for convenience.

Figure 5.1. Summary of analysis of treatment data



5.1.1 Total recall episodes

Recall episodes were identified as a *trigger* utterance, that is, the initial utterance in which the learner produced a non-target-like question form, followed by a *recast* by the native speaker, followed by a cued *recall* of the recast by the learner. As the number of recall episodes experienced by any given subject was contingent upon the subject producing a non-target-like utterance and having it recast, the total occurrences of recall episodes for each group differed. Ratio scores for subjects were used as the basis for analysis. Table 5.1[1] shows totals and mean scores for recasts provided to each group. Note that only the incidence of recasts of question forms is given in these tables; recasts of other types of structures, although they occurred in the data, are not considered here.

[1] While all subjects participated in the five treatment sessions, 10 random sessions (of 165) were inaudible due to poor recording. Data for these sessions are missing in the analysis.

Table 5.1. Total recall episodes for each group

Group	Recall episodes	Recall episodes	
	n	M	SD
High (n=15)	659	43.93	15.36
Inter (n=11)	531	48.27	12.87
Low (n=7)	379	54.14	19.26

n = Total number of recasts recalled
M = Mean based on mean for each individual
SD = Standard deviation

As seen in Table 5.1, when the mean occurrences of recall were compared, the relative number of recasts provided to each group was found to be similar. All groups averaged between 44 to 55 recasts over the five treatment sessions.

5.1.2 Types of question forms

The type of question form appearing in recasts was compared for question types Q3, Q4 and Q5. Examples of these are given in Table 5.2, repeated here for convenience.

Table 5.2. Examples of question forms (See Pienemann & Johnston, 1987)

Form	Description	Example
Q3	Yes/No questions in which auxiliary, do or wh-word fronts canonical word order	Do you have red alien? Is he is son?
Q4	Yes/No questions in which subject and verb/auxiliary are inverted OR wh-word fronts verb	Where is the girl? Is he angry?
Q5	Auxiliary do, have in 2nd position after wh-word and precedes the main verb	What does he do? What is your alien holding?

Although Q2 and Q6 question forms did appear in the data, these were rarely recast (fewer than five tokens in all) and are not included in the analysis below.

When the types of question forms provided in recasts were compared between groups, they were remarkably similar in terms of the proportion of each, as seen in Table 5.3 and Figure 5.2. Almost two thirds of all recasts are of Q4 forms. Questions such as *"is it a ....?"* and *"where is the ...."* were common in the picture-drawing tasks. Q5 forms were also more plentiful than Q3 forms, accounting for approximately a third of forms. Questions such as *"what is he doing?"* and *"what does she do?"* were common in story tasks.

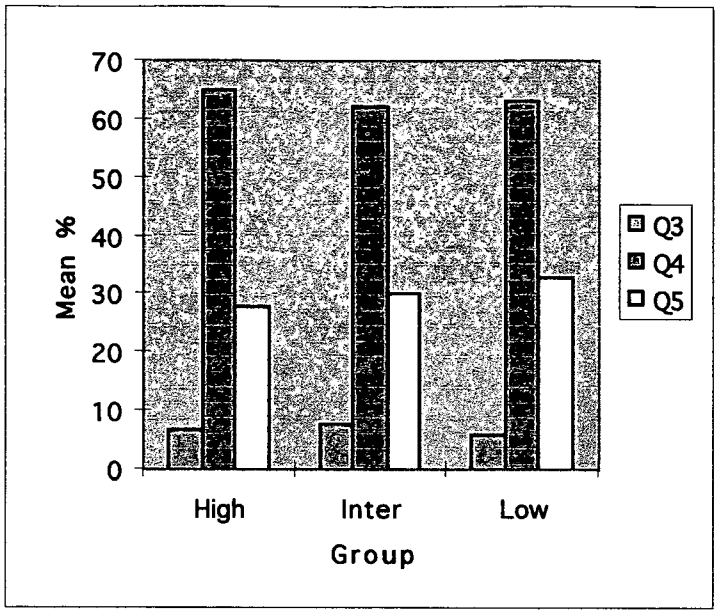
It is important to note that recasts of Q3 forms were relatively few and this may well have had an effect on the statistical analysis of the data. This is discussed in detail below.

Table 5.3. Total occurrences and percentages of recasts of each question form

	Q3		Q4		Q5	
Group	n	%	n	%	n	%
High	44	7%	415	65%	179	28%
Inter	42	8%	316	62%	155	30%
Low	15	6%	237	63%	122	33%

From a summary of the data given in Table 5.3 for recasts of question forms received by each group, it is clear that the three groups received similar proportions of each form. Each group received less than 10% of forms which were at Stage 3 while over 60% of forms were at Stage 4 and approximately 30% were at Stage 5. Figure 5.2 represents this graphically.

Figure 5.2. Percentage of occurrences of question forms in recasts



5.1.3 Length of recast

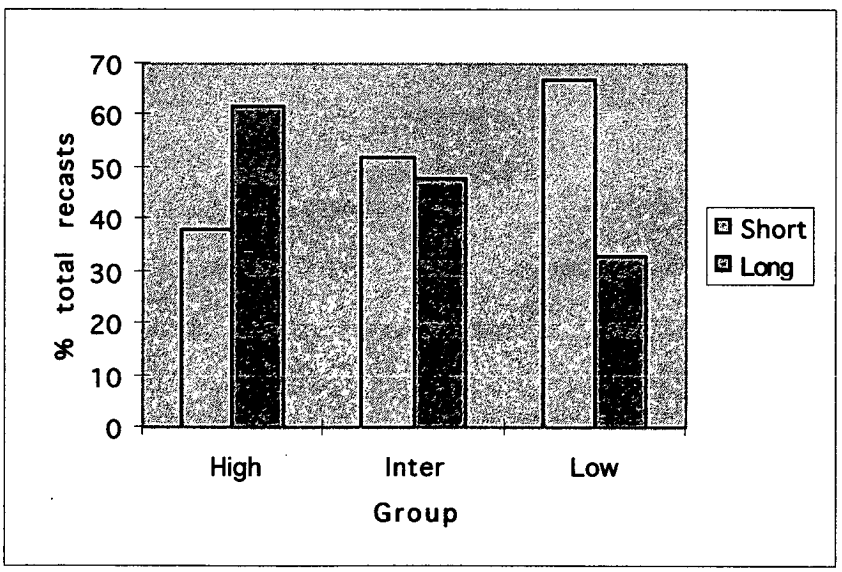
In terms of the length of the recasts provided, the groups differed somewhat. "Short" recasts were fewer than six morphemes in length, such as *" where is the alien?"* . "Long" recasts were identified as having more than five morphemes, such as *"what is your blue alien doing?"*. The Low group received two thirds more short recasts than long recasts, while for the High group the reverse was true; this group received 62% long recasts. The Intermediate group received similar quantities of short and long recasts. This is seen in Table 5.4. The mean number of recasts provided to subjects in each group is also given as an indication of the general numbers of recasts received.

Table 5.4. Length of recasts provided to each group

	SHORT (5 or fewer morphemes)			LONG (6 or more morphemes)		
	n	%	M	n	%	M
High	250	38%	27	407	62%	17
Inter	275	52%	23	254	48%	25
Low	255	67%	18	123	33%	36

In Figure 5.3 the percentage of short and long recasts is compared for each group. This comparison demonstrates that the Low group received a higher proportion of short recasts than the other two groups, while the High group received a higher proportion of long recasts. These findings were significant at the .05 level ($\chi^2 = 85.46$, df=2, $p < .01$) using a Chi-squared analysis.

Figure 5.3. Comparison of percentage of short and long recasts provided to each group



5.1.4 Number of changes to trigger utterance

The number of changes made to the trigger utterance in the recast was described according to whether there were one, two or three or more

changes. All groups received roughly a third of each type in recasts, with some differences. High and Intermediate groups received slightly more recasts with only one change to the trigger utterance (39% and 37% respectively), while those in the Low group received proportionally more recasts with three or more changes to their initial utterance (40%). It is noted that the Low group received a high proportion of recasts of fragments (i.e., incomplete trigger utterances), as reported below in section 5.1.5, and this may account for the higher proportion of changes. Table 5.5 provides totals and proportions of numbers of changes in recasts.

Table 5.5. Changes to trigger utterance in recast : total occurrences and percentages by group

	1 change Sum	2 changes Sum	3 changes Sum	1 change M%	2 changes M%	3 changes M%
High	241	198	218	39	30	31
Inter	192	167	171	37	31	32
Low	114	112	152	30	30	40

M% = mean percentage of number of changes made in recast utterances.

5.1.5 Types of changes made in the recasts

Changes made to the trigger utterance in the recast were identified as being either syntactic, morphological, fragmentary or unrelated to the question form itself.[2] As morphology and syntax are intrinsic to the question form, these accounted for the majority of changes and these are considered in further detail below. The differences between the groups are represented graphically in Figures 5.4-5.6.

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[2] While infrequent, there were cases in which there were a number of different types of changes within the same recast. These were coded once, as one type of change only, according to the following hierarchy; fragment, syntax, morphology, unrelated. This hierarchy was based on the fact that fragments generally involved all other categories, and syntactic changes often involved morphological changes, but not vice versa.

There were a greater number of syntactic changes the lower the group's level: they accounted for almost a third of changes for the High group, but almost half of all changes for the Low group. Approximately a quarter of changes in recasts were morphological. For the High group, 27% of recasts contained changes to features unrelated to the question form itself, such as a change of preposition. For the Intermediate group, such changes represented 18% of all recasts while for the Low group, unrelated changes accounted for only 11% of recasts. The Low group received higher proportions of recasts of fragments (22%), twice as many as the High group (11%) and Intermediate group (12%).

Figure 5.4. Type of change to trigger utterance in recast: High group

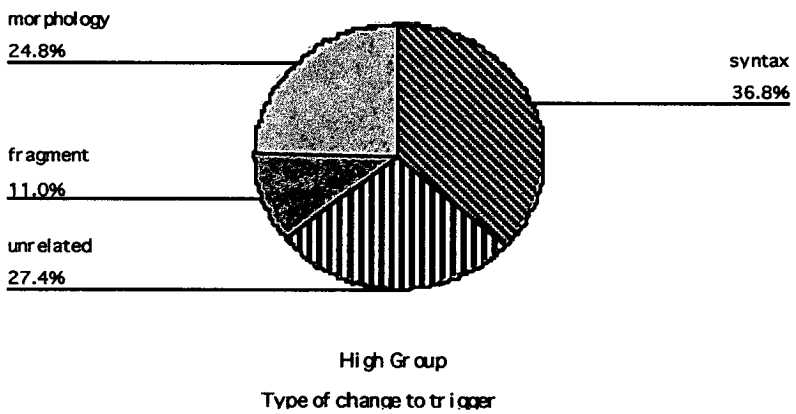


Figure 5.5. Type of change to trigger utterance in recast: Intermediate group

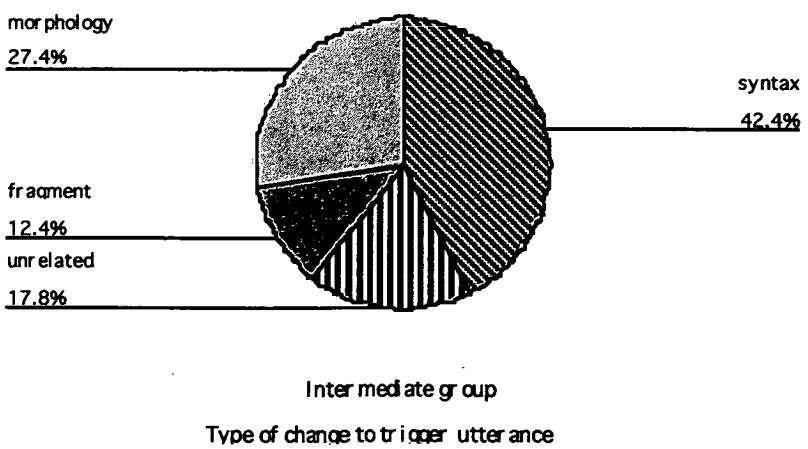
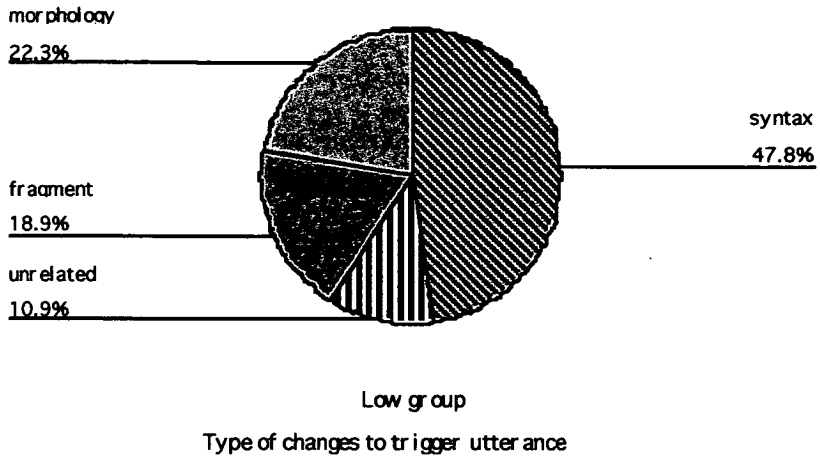


Figure 5.6. Type of change to trigger utterance in recast: Low group



A breakdown of the types of morphological and syntactic changes made to the trigger utterance is given in Table 5.6. As noted above, over 40% of changes were syntactic, of which 20% involved the insertion of an argument. Changes made to the question form by fronting were relatively rare in recasts.

In terms of changes to morphology, results were similar for all groups; about half of the changes to morphology entailed changes to verb morphemes, and about half involved substitution of the auxiliary (see Figure 3.1 in the previous chapter for examples).

Table 5.6. Breakdown of types of morphological and syntactic changes in recasts by percentage

	SYNTAX			MORPHOLOGY	
	Fronting	Insertion	Inversion	Aux/verb	Substitution
GP	M%	M%	M%	M%	M%
High	5	20	8	15	12
Inter	4	22	11	15	15
Beg	6	25	9	11	15

M% = Mean ratio percentages of total for each group.
Remaining percentages, not reported here, are changes to fragments or changes unrelated to the question form itself.

5.1.6 Summary of description of recasts provided in treatment sessions

In general, all groups were similar in terms of recasts provided. All received an average of 44 to 55 recasts of question forms over five sessions. Recasts were most frequently of Stage 4 type questions. The High group was presented more frequently with long recasts, while the Low group received more short recasts. All groups received similar amounts of recasts with one, two or three or more changes to the learner's trigger utterance, although the Low group received slightly more of the latter. Changes to recasts most commonly involved syntactic or morphological changes.

5.2 Results of hypothesis testing

The first five hypotheses were tested using One-way ANOVA with Contrasts or *t*-tests for paired samples, as appropriate.

5.2.1 Accuracy of recall

> *H1*: Accuracy of recall is correlated with the level of the learner, such that the higher the level of the learner the greater the accuracy of recall: High > Intermediate > Low.

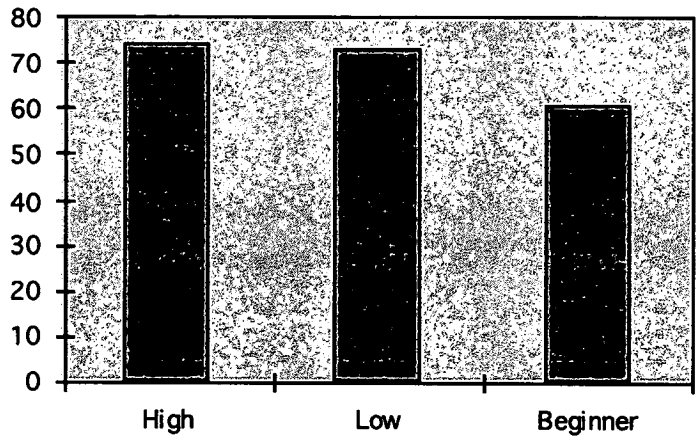
Hypothesis 1 was partially supported.

One-way ANOVA with Contrasts was used to determine differences between groups (see Table 5.8 below). Both the High and Intermediate groups produced higher percentages of correct recall than the Low group (df 2, F=4.1695, p<.05), as seen in Table 5.7. There was no difference between the High and Intermediate groups in terms of correct recall. These results are represented graphically in Figure 5.7.

Table 5.7. Correct recall by groups.

Variable	Subjects	Correct recall		
	n	M	SD	SE of Mean
High	15	74.179	12.059	3.114
Inter	11	73.203	8.896	2.682
Low	7	60.675	9.957	3.764

Figure 5.7. Correct recall by group



In Table 5.8, the performance of the three groups is compared on accuracy of recall through One-way ANOVA. The F ratio indicates that there is a difference between the groups ($p<.05$). *A priori* use of contrasts were then used to establish the source of difference[3]. Contrasts between (a) the High and Intermediate group and (b) the High and Intermediate group versus the Low group found, as seen in Table 5.9, that the High and Intermediate groups were not significantly different in performance on recall, while there was a significant difference between these two groups and the Low group.

[3] To locate differences between means, a priori contrasts were used as this allows comparison between smaller means than, for example, a post-hoc Scheffé test.

Table 5.8. One-way ANOVA for three groups on correct recall

Source	DF	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	951.2820	475.6410	4.1695	.0252
Within Groups	30	3422.2649	114.0755		
Total	32	4373.5469			

Table 5.9. Results of ANOVA with Contrasts on accuracy of recall

Contrast 1 : High + Inter = Low Contrast 2 : High = Inter
Separate Variance Estimate

Value	S. Error	T Value	DF	T	Prob.
Contrast 1	26.0328	8.5759	3.036	9.9	.013*
Contrast 2	.9764	4.1097	.238	24.0	.814

Following analysis by ANOVA, *t*-tests were used to confirm the comparisons between the groups. Tables 5.10-5.12 provide statistical results for *t*- test comparisons. In Table 5.10, the performance of the High and Low groups is compared on accuracy of recall. These groups were significantly different in their ability to recall recasts ($p<.05$).

Table 5.10. *t*-tests for independent samples by group on correct recall : High = Low
t-test for Equality of Means at 95%

Variances	*t*-value	df	2-Tail SIG	SE of Diff	CI for Diff
Unequal [4]	2.76	14.18	.015	4.885	(3.040, 23.969)

In Table 5.11, the performance of the Intermediate and Low groups is compared on accuracy of recall. These groups were significantly different in their ability to recall recasts ($p<.05$).

[4] Unequal variance was assumed for all *t*- tests. In all cases where choices were made, the conservative choice was taken.

Table 5.11. *t*-tests for independent samples by group on correct recall : Inter vs Low

Variances	*t*-value	df	2-Tail SIG	SE of Diff	CI for Diff
Unequal	2.71	11.81	.019	4.622	(2.441, 22.615)

In Table 5.12 the performance of the High and Intermediate groups is compared on accuracy of recall. These groups were not found to be significantly different in their ability to recall recasts (p= .814).

Table 5.12. *t*-tests for independent samples by group on correct recall : High vs Intermediate

Variances	*t*-value	df	2-Tail SIG	SE of Diff	CI for Diff
Unequal	.24	23.99	.814	4.110	(-7.506, 9.459)

Accuracy of recall for each group was compared according to whether the recast was recalled correctly, was modified in some way or was simply not recalled. These data appear in Table 5.13. Each subject received between 40 to 55 recasts and produced on average 30 to 35 correct recalls. Thus, for all groups there were many more correct recalls than modified recalls and few failed recall attempts.

Table 5.13. Performance on accuracy of recall for each group: mean tokens

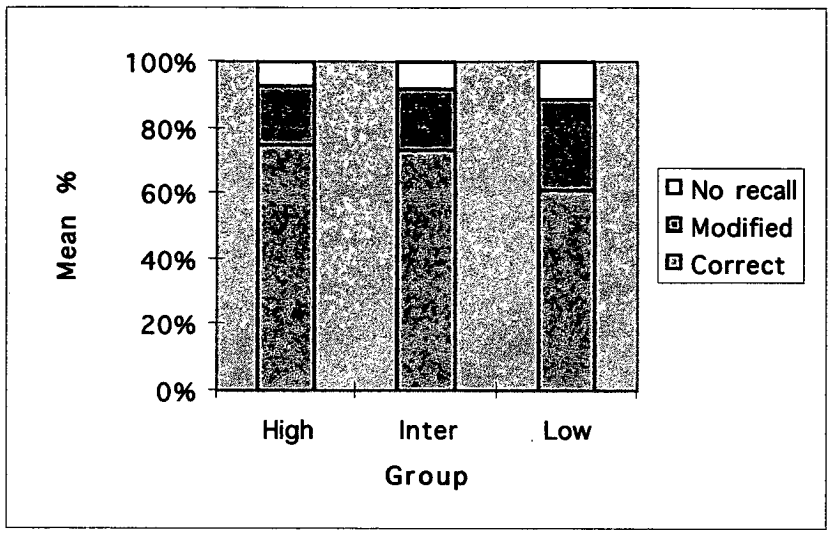
	High	Inter	Low
	M	M	M
Correct	32	35	33
Modified	8	9	15
No recall	3	4	6
Total	43	48	54

M = Mean tokens (instances) of recall for each group.

In terms of the proportion of correct recall, modified recall and failed recall, there was no difference between the High group and the Intermediate group. The Low group modified rather than reproduced the

recast in recall in 27% of cases, while for the High and Intermediate group this occurred in 19% of cases. Less than 10% of recasts were not recalled at all for the High and Intermediate group, and 11% for the Low group. This is represented in graphic form in Figure 5.8.

Figure 5.8. Accuracy of recall for each group



In summary, Hypothesis 1 was supported to the extent that Low learners recalled recasts of their non-target-like utterances with significantly less accuracy than the High or Intermediate groups ($p<.05$). No difference was found between the High and Intermediate group learners.

5.2.2 Accuracy of recall and type of question forms in recast

Hypothesis 2 concerned learners' accuracy of recall according to the type of question form recast.

> *H2:* Learners will show a significantly higher percentage of correct recall for question forms that are within their level than for question forms that are beyond their level.

Hypothesis 2 was partially supported.

In order to compare accuracy of recall on the different types of question forms, *t*-tests for paired samples were used. A significant difference was found between recall of Q4 and Q5 question forms (df=32, p<.05), but not between Q3 and other forms[5]. Subjects recalled Q4 forms with greater accuracy than Q5 forms (df=32, p<.05). These results are presented in Table 5.14. It should be noted in the table that standard deviations for each comparison of question forms were particularly high, that is there was considerable variance within the group as a whole.[6]

Table 5.14. Comparison of accuracy of recall on Q3, Q4 and Q5 question forms: Results of *t*-test for paired samples (N=33)

Form	df	M	SD	SE of M	t-value	2-tail SIG	
Q3 > Q4	27	-9.3912	34.415	6.504	-1.44	.160	ns
Q3 > Q5	27	1.3845	34.409	6.503	.21	.833	ns
Q4 > Q5	32	10.1384	20.126	3.504	2.89	.007	**

One-way ANOVA with Contrasts was used to compare each group's performance of recall of each type of question form. The results of this analysis are presented below in Tables 5.15 and 5.16.

[5] As SPSS deletes cases with missing values, those subjects who did not receive any recasts of Q3 forms were excluded in the analysis, reducing the number of subjects to 28. Of the five subjects who did not receive recasts of Q3, three were from the High and two from the Low group. In addition, as seen in Table 5.14, the standard deviation was very high as tokens were few and some subjects scored 100%, others 0% on the basis of two to three recalls. For these reasons, data for Q3 are presented using descriptive statistics alone. H2 was tested for Q4 and Q5 only.

[6] These results are true for data of all three groups combined (N=33). The same levels of significance were found when only data from the Low and High groups were included in the analysis (N=26).

Table 5.15. Description of accuracy of recall of question forms for each group

GP	Q3			Q4			Q5		
	M	SD	SE	M	SD	SE	M	SD	SE
High (N=15)	70.513	36.581	10.146	77.557	12.710	3.282	69.176	17.847	4.608
Inter (N=11)	63.958	32.169	11.374	77.410	13.424	4.047	68.130	14.165	4.271
Low (N=7)	59.524	44.987	17.003	66.180	9.0711	3.429	50.928	21.621	8.172

There were no significant differences between the High and Intermediate groups when recall of individual types of question forms was compared. In other words, these two groups responded with similar degrees of accuracy of recall to Q4 and Q5 question forms. The difference between these two groups and the Low group, however, was statistically significant, as seen in Table 5.16. The Low group demonstrated less accuracy in recall for each type of question form, particularly for Q5 forms compared to the other two groups.

Table 5.16. Results of One-way ANOVA with Contrasts, comparing groups on recall of Q4 and Q5 forms

	Q4 T Prob	Q5 T Prob	Interpretation
High/Inter = Low	.040*	.025*	The High and Intermediate groups differ from the Low group
High = Inter	.976	.882	High group is equal to the Intermediate group

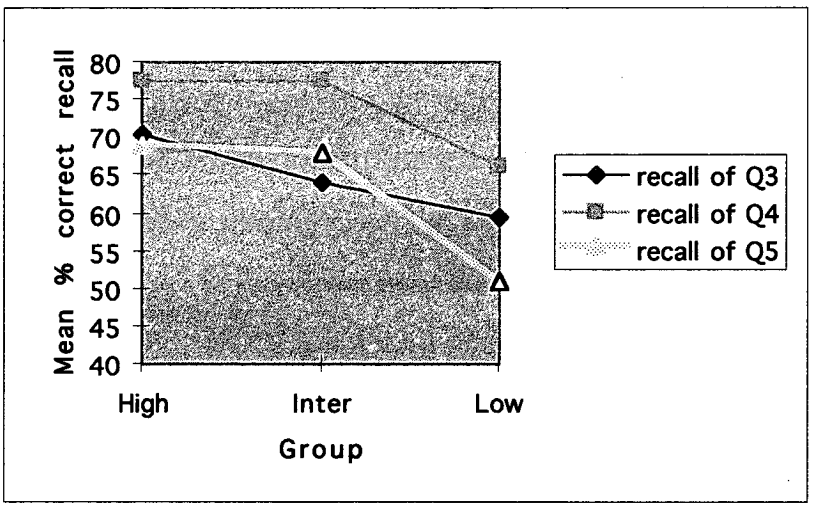
* = significant difference at .05 level.

As seen in Table 5.15 above, the High and Intermediate groups recall Q4 forms with almost 78% accuracy and Q5 forms with approximately 69 % accuracy. The learners in the Low group, in contrast, recall with accuracy 66% of Q4 forms and 51% of Q5 forms. Surprisingly, all groups recalled Q3 forms with less accuracy than they did Q4 forms. In this respect

Hypothesis 2 was not supported. However, this result may be an artefact of the relative frequency of each type of form; tokens of Q3 forms were much fewer than for Q4 or Q5 as noted above, representing less than 10% of all recasts. In terms of individuals, this translates as most subjects receiving only one or two recasts of Q3 forms over five sessions.

Figure 5.9 represents the percentage of correct recall for each group according to the type of question form in the recast utterance. Recall of Q4 forms was more accurate for all groups, and recall of Q5 forms was more accurate than Q3 for the Intermediate group only. In addition, accuracy of recall on Q5 forms was particularly low for the Low group.

Figure 5.9. Percentage of correct recall according to question form



In summary, Hypothesis 2 was partially supported. All groups recalled Q5 forms with less accuracy than Q4 forms, as predicted by the hypothesis. However, Q3 forms were not recalled with greatest accuracy as expected. This was attributed to the small number of tokens of Q3 forms in the data.

5.2.3 Accuracy of recall and length of utterance

Hypothesis 3 concerned the length of the recast utterance as a variable affecting accuracy of recall

H3: Accuracy of recall will be higher for shorter recasts than longer recasts.

Hypothesis 3 was supported.

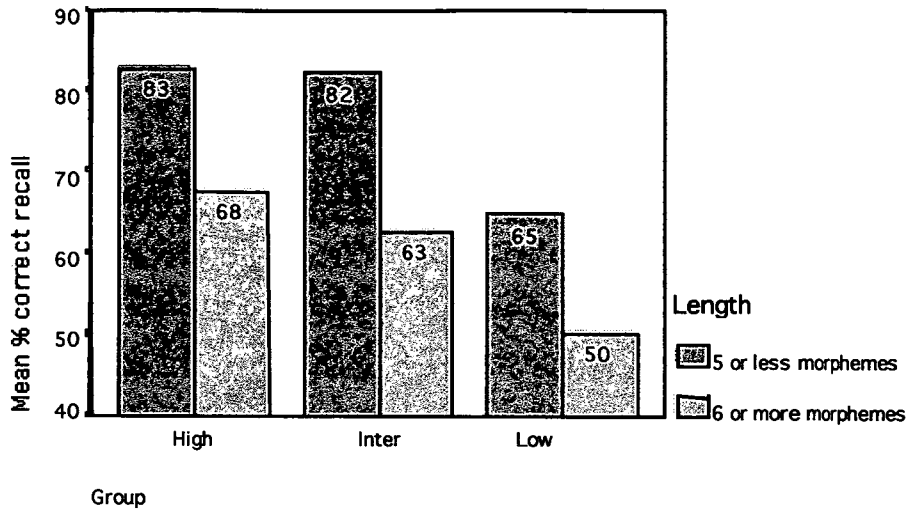
Recasts of five or less morphemes were recalled with greater accuracy than recasts of six or more morphemes (df=32, $p<.05$). This is seen in Table 5.17, reporting the results of a *t*-test for paired samples for all subjects.

Table 5.17. Comparison of accuracy of recall for short and long recasts: *t*-test for paired samples

Length of recast			Correct recall	
	n	1-tail SIG	M%	SD
Short: ≤ 5 morphemes	780		78.9268	14.319
		.015*		
Long: ≥ 6 morphemes	784		62.3531	16.667

For the High and Intermediate groups, the percentage of correct recall was as much as 15% higher for recasts of five or less morphemes in length than for recasts of greater length, with over 80% accuracy on recall of short recasts. Similarly, the Low group performed far better on shorter recasts than on longer recasts, recalling the latter with only 50% accuracy on average. This is seen in Figure 5.10 below.

Figure 5.10. Percentage of correct recall according to length of recast



In summary, Hypothesis 3 was supported. There was a significant correlation between length of recast and accuracy of recall. Shorter recasts were recalled with greater accuracy than longer recasts.

5.2.4 Accuracy of recall and number of changes to trigger utterances in recast

Accuracy of recall was compared according to whether there were one, two or three or more changes to the trigger utterance in the recast.

> *H4:* Accuracy of recall will be higher the fewer changes made in the recast.

Hypothesis 4 was supported.

The results of a *t*-test for paired samples indicated that all groups performed better the fewer the changes to the trigger utterance, ($df=32$, $p<.05$). This is seen in Table 5.18 below.

Table 5.18. Comparison of accuracy of recall according to the number of changes in the recast utterance: *t*-test for paired samples

Variable	M	SD	SE of mean
1 change	79.0044	15.373	2.676
3 changes	60.0777	16.665	2.901

Paired differences					
M	SD	SE of Mean	t-value	df	2-tail SIG
18.9267	18.941	3.297	5.74	32	.000

Results of *t*-tests for paired samples also indicated that, for the High and Intermediate groups, there was a significant difference in accuracy of recall for recasts with only one change compared to recasts with two changes (t=2.07, df= 25, p<.05). This was also true of recasts with two changes compared to recasts with three changes (*t*= 3.71, df= 25, p< .05). These results appear in Tables 5.19 and 5.20.

Table 5.19. *t*-test for paired samples (High and Intermediate groups only)[7]: correct recall on recasts of 1 change vs 2 changes

Variable	M	SD	SE of Mean
1 change	83.0123	12.131	2.379
2 changes	75.7312	14.821	2.907

Paired Differences 95% CI (.027, 14.535)					
M	SD	SE of Mean	t-value	df	2-tail SIG
7.2811	17.959	3.522	2.07	25	.049*

[7] The Low group showed no significant difference between recall of recasts of one change and recasts of two changes.

Table 5.20 *t*-test for paired samples (High and Intermediate groups only): Correct recall on recasts of 2 changes vs 3 changes

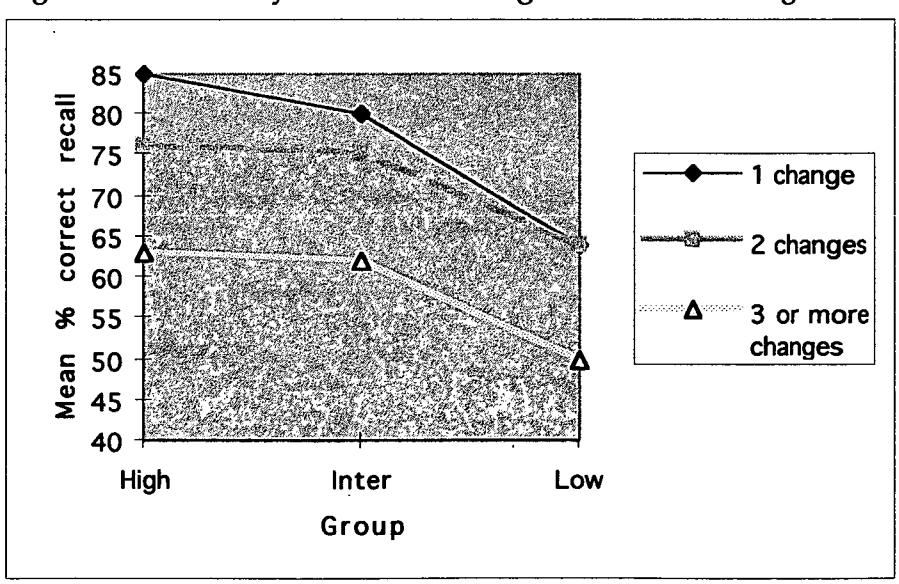
Variable	M	SD	SE of Mean
2 changes	75.7312	14.821	2.907
3 changes	62.6569	15.990	3.136

Paired Differences 95% CI (5.821, 20.328)

M	SD	SE of Mean	*t*-value	df	2-tail SIG
13.0742	17.958	3.522	3.71	25	.001*

As seen in Figure 5.11, the High and Intermediate groups performed with approximately 20% greater accuracy on recasts containing only one change compared to recasts of three or more changes. The High group correctly recalled over 85% of recasts with only one change compared to 63% of recasts with three or more changes. The Intermediate group was similar, recalling 80% and 62% respectively. The Low group performed with 14% greater accuracy on recasts with one or two changes, correctly recalling 64% of recasts with one or two changes and only 50% of recasts with three or more changes.

Figure 5.11. Accuracy of recall according to number of changes in recast



In summary, Hypothesis 4 was supported by the results in that all groups recalled recasts with three or more changes with less accuracy than recasts with fewer changes.

5.2.5 Accuracy of recall and changes between the trigger utterance and the recast

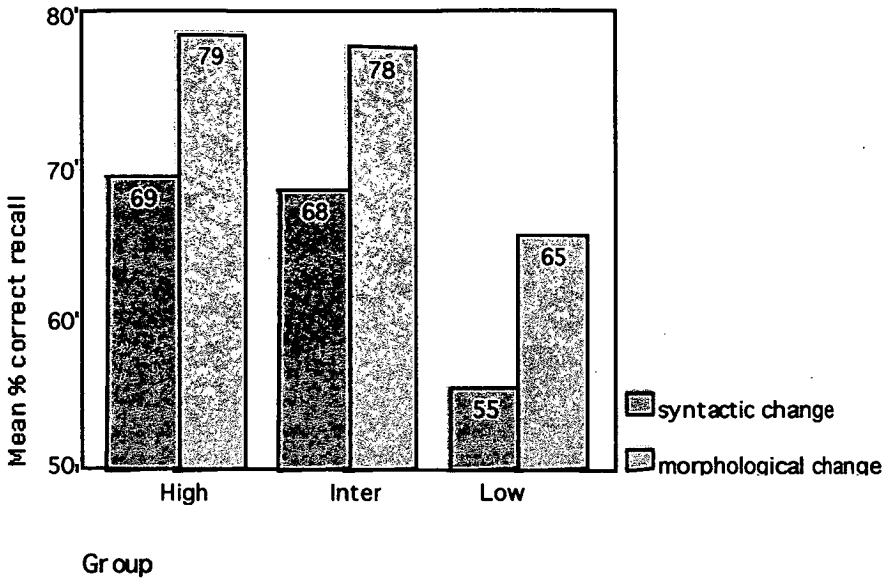
Hypothesis 5 concerned the relationship between the type of differences between the recast and the learner's original trigger utterance.

> *H5:* Accuracy of recall will differ according to the type of change made in the recast utterance, such that syntactic changes will be recalled with greater accuracy than morphological changes.

Hypothesis 5 was not supported.
All groups were more accurate on recall of recasts which involved morphological errors than on recasts involving recasts of syntactic errors (*t*-test for paired samples, df 32, $p < .05$). A clear difference between recall of syntactic and morphological change was found, as seen in Figure 5.12. All groups performed with 10% greater accuracy on morphological changes.

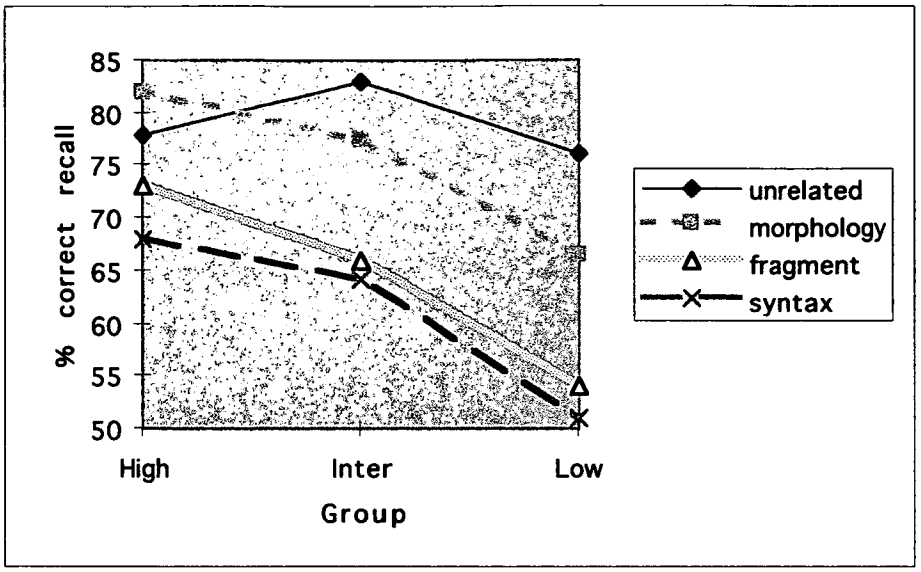
The High and Intermediate groups recalled morphological changes in recasts with almost 80% accuracy, compared to almost 70% for syntactic changes. The Low group followed the same pattern, recalling morphological changes with 65% accuracy and syntactic changes with 55% accuracy.

Figure 5.12. Accuracy of recall: structural vs morphological changes



Thus accuracy of recall was similar according to the type of change made in the recast. The results represented in Figure 5.13 below suggest that all groups, but particularly the Intermediate group and the Low group, found recasts containing changes which were not concerned with the actual question form itself (i.e., "unrelated" changes) easiest to recall. Morphological changes were recalled with second highest accuracy by all groups. Concerning syntactic changes, the High group recalled recasts involving insertion less accurately than those involving fronting or inversion, while for the Intermediate group the reverse was true.

Figure 5.13. Comparison of correct recall on structural, morphological and other types of changes to the trigger utterance



A further breakdown of types of changes within the broad categories of morphology and syntax is treated below.

When accuracy of recall was compared according to the type of difference between the recast and the trigger utterance, certain patterns emerged. All groups scored relatively low on fronting yet high on changes to morphology and unrelated changes. Each group is treated individually below. Table 5.21 provides a summary of the results.

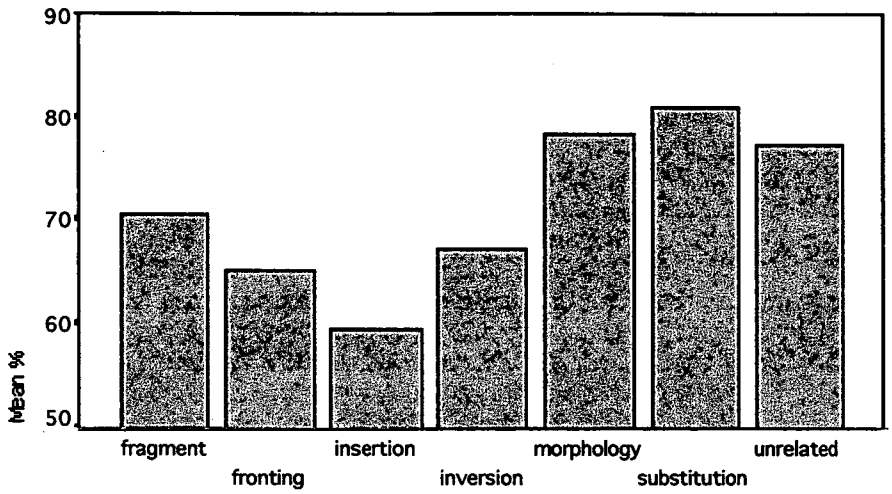
Table 5.21. Percentage of correct recall for type of difference in recast

	Syntax			Morphology		Other	
Group	Fronting	Insertion	Inversion	Morphology	Substitution	Fragment	Unrelated
	%	%	%	%	%	%	%
High	67	65	72	78	86	73	78
Inter	58	72	63	80	75	66	83
Beg	48	54	51	87	46	54	76

The following three figures (5.14-5.16), generated from the data in Table 5.21 and explained below, present mean percentage of correct recall of

recasts produced by each group according to types of difference in the recast.

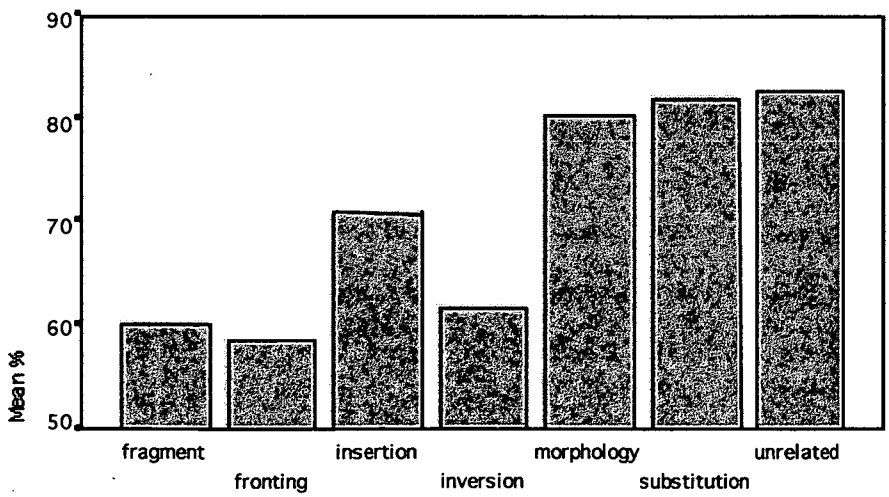
Figure 5.14. High group. Mean percentage of correct recall according to type of difference between recast and trigger utterance



High group : Mean % scores for correct recall

The High group was lowest in accuracy on syntactic changes: for insertion (65%); and fronting (67%) in particular, and highest on substitution (86%), morphology (78%) and unrelated changes (78%).

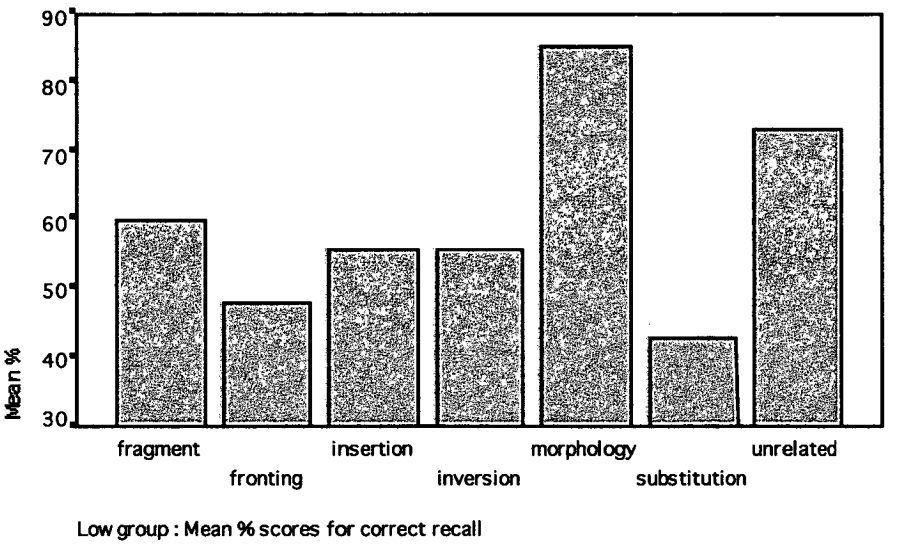
Figure 5.15. Intermediate Group. Mean percentage of correct recall according to type of difference between recast and trigger utterance



Inter group : Mean % scores for correct recall

The students in the Intermediate group showed relatively low accuracy of recall for fronting (58%), fragments (66%) and inversion (63%) yet, as with the High group, they produced high levels of correct recall for morphology (80%) and unrelated changes (83%).

Figure 5.16. Low group. Mean percentage of correct recall according to type of difference between recast and trigger utterance



The Low group showed proportionally very high levels of accuracy of recall for morphology (87%), yet very low accuracy for substitution (46%) and fronting (48%). Other syntactic changes were also recalled with limited success: insertion (54%) and inversion (51%).

In summary, Hypothesis 5 was not supported. Although accuracy of recall did differ according to the type of change made in the recast utterance, morphological changes in recasts were generally recalled with greater accuracy than syntactic changes, not vice versa.

5.2.6 Summary of results of hypothesis testing

In summary, learners did notice recasts in the context of task-based interaction and were able to recall these recasts in response to an

immediate unanticipated cue. However, ability to recall was constrained by a number of factors, including the variables of type of question form, length of the recast, number of changes to the trigger utterance and type of change to the trigger utterance. These factors are described in greater detail in the following chapter through a qualitative analysis of the treatment sessions. A summary of the results of hypothesis testing is provided in Table 5.22 below. The implications of these findings are discussed in detail in Chapter 7.

Table 5.22. Summary of results of hypothesis testing

Hyp.	Correlation of accuracy of recall &:	Result	
H1	Level of the learner: High > Inter > Low.	partially supported. High = Inter > Low	The High and Intermediate groups were more accurate on recall of recasts than the Low group (df 2, p<.05).
H2	Stage of the question form: Q3 > Q4 > Q5.	partially supported. Q4 > Q5	All groups recalled Q4 forms more accurately than Q5 forms (df 32, p<.05). Tokens of Q3 forms were too few to include in the analysis.
H3	Length of the recast utterance: Short > long	supported. Short > long	All groups recalled short recasts (five or less morphemes) with greater accuracy than longer recasts (df 32, p<.05).
H4	Number of changes made in the recast: 1 change > 2 > 3 changes	supported. 1 > 2 > 3 changes	All groups recalled with greater accuracy recasts including fewer than 3 changes (df 32, p<.05).
H5	Type of change made in the recast: Syntax > morphology	not supported. Morphology > syntax	All groups were more accurate on recall of recasts making morphological changes than syntactic changes (df 32, p<.05).

5.3 Incorporation and integration of recasts : analysis of pre- and post-test data

This section deals with the question "What effect does noticing have on interlanguage change?". The question was answered in two ways; first through a quantitative analysis of pre- and post-test data according to the types of questions produced by learners; and, secondly, through a qualitative analysis of learners' incorporation of recasts in the treatment sessions. It is the first analysis which is reported in this section. The qualitative analysis is presented in detail in the following chapter.

The quantitative analysis was twofold. First, a comparison was made of each group's production of different types of question forms in the pre-test and the three post-tests. Secondly, the proportion of different types of question forms produced by each group in each test was examined.

5.3.1 Production of question forms in test sessions

A comparison was made of each group's production of different types of question forms in the pre-test and the three post-tests, following Mackey (1995). Tables 5.23-5.25 provide means and standard deviations for the different types of questions produced by each group in each test. Owing to attrition[8], scores for some of the tests are missing for some subjects and for this reason, N sizes differ on test comparison.

[8] Scores were missing for subjects from each group within random test sessions (12 of 132 sessions) owing to both recording difficulties and absenteeism. As the data represented are based on mean scores, it was decided to retain all data rather than reduce numbers in each group or use "dummy" scores based on group means.

Table 5.23. High group. Mean raw scores for production of question forms in each test

HIGH GROUP		Q3		Q4		Q5	
N	Test	M	SD	M	SD	M	SD
14	pre-test	6.214	5.177	10.500	3.589	5.929	3.452
14	Post 1	7.714	4.410	15.000	8.788	10.571	4.783
14	Post 2	5.714	4.445	14.000	3.903	8.000	4.243
13	Post 3	9.077	8.180	18.231	7.096	11.308	5.234

Table 5.24. Intermediate group. Mean raw scores for production of question forms in each test

INTER GROUP		Q3		Q4		Q5	
N	Test	M	SD	M	SD	M	SD
10	pre-test	4.300	4.191	8.300	3.498	3.100	1.595
10	Post 1	5.200	5.928	12.400	5.461	8.600	4.881
10	Post 2	4.300	3.561	11.600	7.382	7.100	4.280
11	Post 3	10.000	8.050	17.364	9.615	10.909	4.888

Table 5.25. Low group. Mean raw scores for production of question forms in each test

LOW GP		Q3		Q4		Q5	
N	Test	M	SD	M	SD	M	SD
6	pre-test	2.000	2.683	4.333	2.732	1.667	1.211
6	Post 1	4.167	2.041	5.000	2.530	5.167	3.251
5	Post 2	3.400	2.702	5.800	2.864	3.000	2.549
7	Post 3	6.429	4.353	10.000	7.211	5.000	7.746

When raw scores are compared, all groups produced progressively more question forms in total from pre-test through to Post-test 3, with a slight

decrease in Post-test 2[9]. Further, in general, all groups produced more of each type of question form, producing higher amounts of Q3, Q4 and Q5 forms in the final post-test. This is presented graphically in Figures 5.17-5.19. It is particularly interesting to compare the pre-test with Post-test 3 as these tests consisted of matched tasks. The story-completion task involved the same set of pictures, although a slightly different story, and the picture-difference tasks were the same.

As was true of the treatment sessions, all groups produced higher numbers of Q4 forms than Q3 or Q5 forms. Further, production of Q4 forms was highest in Post-test 3.

Figure 5.17 depicts the data in Table 5.23. The High group produced the greatest numbers of Q4 forms. There was an increase in all question forms from pre-test to Post-test 3.

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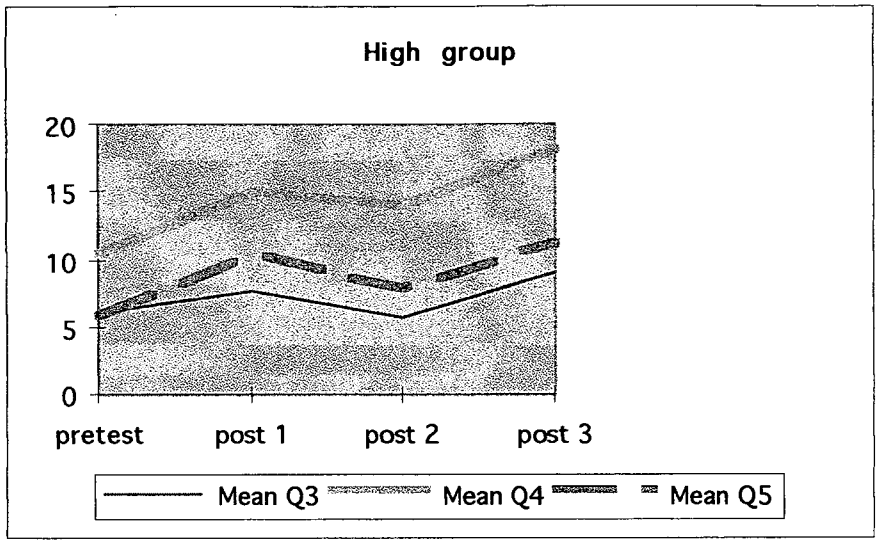
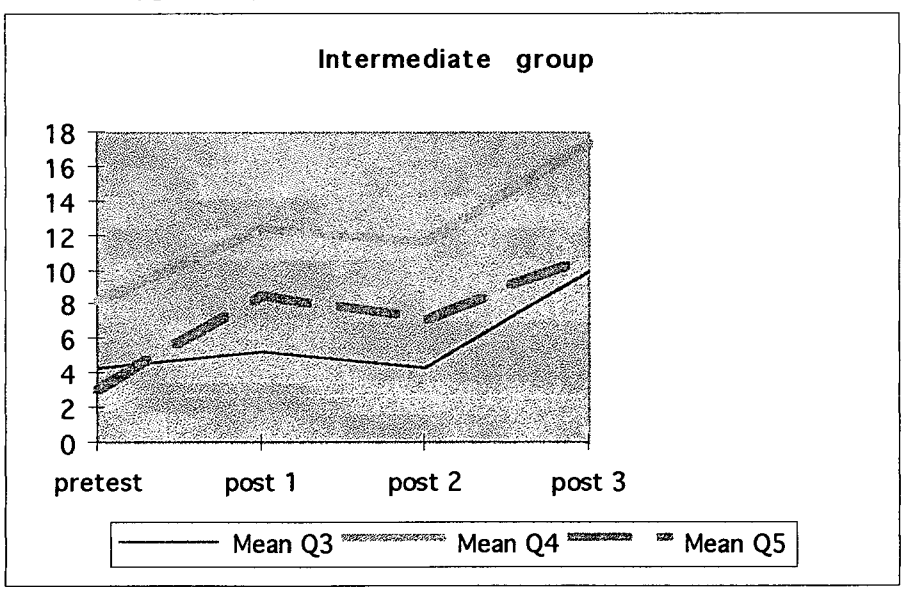
[9] A similar analysis was carried out by Mackey (1995) involving learners working on very similar tasks. Mean percentages found here for Q3 forms were comparable to those found by Mackey, however means for Q4 and Q5 forms were much higher in this study. In part this may be due to a difference in the level of the learners: the High and Low level learners were at Stages 4 and 5 initially, while those in Mackey's study were at Stage 4. It is puzzling however, why the Low group should also show higher means. Standard deviations were also higher.

Figure 5.17. High group. Comparison of mean raw scores on production of different types of question forms in pre- and post-tests



The data in Table 5.24 are graphically represented in Figure 5.18. The Intermediate group produced more of each type of question form in Post-test 3 compared to the pre-test.

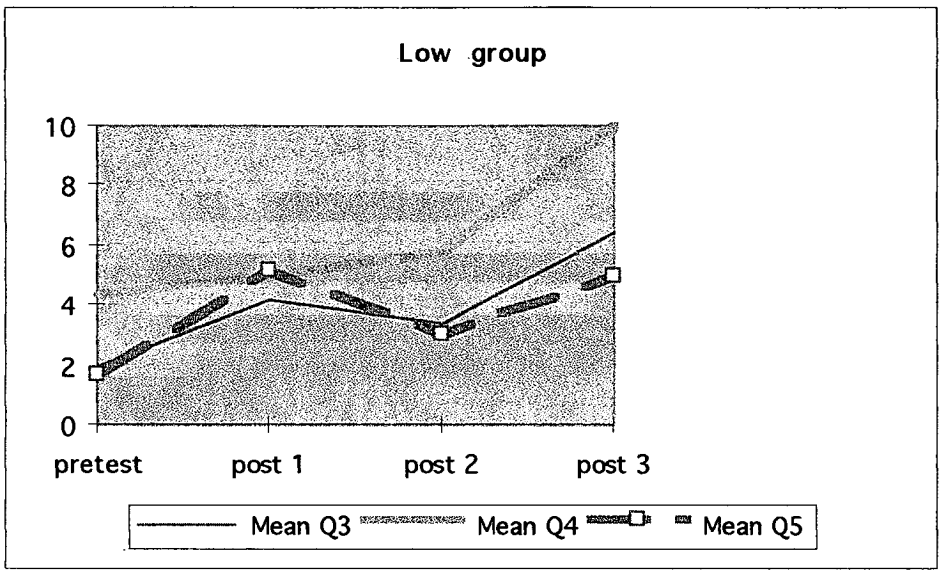
Figure 5.18. Intermediate group. Comparison of mean raw scores on production of different types of question forms in pre- and post-tests



The data in Table 5.25 are pictured in Figure 5.19. The Low group also produced more of each type of question form in Post-test 3 compared to the pre-test. As for the other two groups, there was a slight decrease in questions produced in Post-test 2 compared to Post-test 1 (see Mackey,

1995 for similar findings). The numbers of questions produced, however, did not drop below pre-test performance.

Figure 5.19. Low group. Comparison of mean raw scores on production of different types of question forms in pre- and post-tests



The differences between tests, on the basis of raw scores were found to be significant for some forms. The results of non-parametric testing are given below in Tables 5.26-5.28. Wilcoxon Matched-pairs test was used rather than One-way ANOVA (see Mackey 1995, in press; Mackey & Philp, 1998, for use of the latter with similar data).[10] As seen from the tables above, there was high variability within groups and therefore a normal population could not be assumed. The Wilcoxon Matched-pairs test was used because it takes into account the degree of change as well as the existence and direction of change (Hatch & Lazaraton, 1991).

For Table 5.26 and those following, 'N' refers to the number of learners in each group, 'n' to the number of learners within the group who increased in their production of the question form, 'z' refers to the z-score, 'p' to 2-tail significance. Significance at the .05 level, or less, is marked by an asterisk.

[10] Although the results of non-parametric testing are reported here as the more conservative measure, results gained through analysis by ANOVA and by *t*-test were found to be similar.

The High group consisted of learners who were all identified as being at least at Stage 5 in the pre-test. As seen in Table 5.26, these learners produced significantly more Q4 questions in all post-tests ($p<.05$), with 10 of 12 learners showing an increase in Post-test 3. There were significantly more Q5 forms in Post-tests 1 and 3 ($p<.01$), with 10 of 13 and of 12 learners showing an increase, respectively. There were no significant differences in this group's production of Q3 forms in any of the tests.

Table 5.26. High group. Results of comparison of pre- and post-tests for each type of question form, using Wilcoxon Matched-pairs tests on raw scores

		Q3			Q4			Q5		
Test comparison	N	n	z	p	n	z	p	n	z	p
pre-test vs Post 1	13	8	-.510	.610	8	-2.045	.041*	10	-2.801	.005**
pre-test vs Post 2	13	6	-.559	.576	9	-2.548	.011*	9	-1.334	.182
pre-test vs Post 3	12	7	-.889	.374	10	-2.719	.007**	10	-2.589	.010**

n = number of learners who increased production of this form from pre-test to post-test. (Remaining learners decreased or were even in their production of the form).
*p<.05 **p<.01

The results for the Intermediate group are seen in Table 5.27. The learners in this group were identified as being at least at Stage 4 in the pre-test. They produced significantly more Q4 forms in Post-test 3 ($p<.05$) and more Q5 forms in all post-tests compared to the pre-test ($p<.05$). All 10 learners showed an increase in production of Q5 forms in the final post-test. Fewer Q3 forms were produced in the pre-test than in Post-test 3 ($p<.05$), with 9 of 10 learners showing an increase.

Table 5.27. Intermediate group. Results of comparison of pre- and post-tests for each type of question form, using Wilcoxon Matched-pairs tests on raw scores

		Q3			Q4			Q5		
Test comparison	N	n	z	p	n	z	p	n	z	p
pre-test vs Post 1	9	5	-.676	.499	8	-1.777	.075	7	-2.366	.018*
pre-test vs Post 2	9	5	-.888	.374	5	-1.481	.139	6	-2.197	.028*
pre-test vs Post 3	10	9	-2.497	.012*	8	-2.293	.022*	10	-2.803	.005**

*p<.05 **p<.01

The learners in the Low group, who were initially lower than Stage 4 in the pre-test, produced significantly more Q4 forms in the final post-test than in the pre-test (p<.05). Five of six learners increased in their production of Q4 forms in this post-test. This group produced significantly more Q5 forms in Post-test 1 than the pre-test, with all learners showing an increase. This is seen in Table 5.28. The smaller N size for this group may have contributed to less statistical evidence of change between tests.

Table 5.28. Low group. Results of comparison of pre- and post-tests for each type of question form, using Wilcoxon Matched-pairs tests on raw scores

		Q3			Q4			Q5		
Test comparison	N	n	z	p	n	z	p	n	z	p
pre-test vs Post 1	5	4	-1.079	.281	3	-.548	.584	5	-2.023	.043*
pre-test vs Post 2	5	3	-1.461	.144	3	-1.278	.201	3	-1.095	.273
pre-test vs Post 3	6	3	-1.214	.225	5	-2.023	.043*	4	-1.826	.068

*p<.05

In summary, all groups produced significantly more question forms in post-tests compared to pre-tests for certain question forms. The High group showed increases in both Q4 and Q5 forms, with the exeption of Q5 forms in Post-test 2. The Intermediate group demonstrated increased production of Q3 and Q4 forms in the final post-test and Q5 forms in all post-tests compared to pre-test performance. The Low group showed

fewer statistically measurable differences, demonstrating increased production of Q4 forms in Post-test 3 and of Q5 forms in Post-test 1.

5.3.2 Proportion of each type of question form produced in each test session

A limitation of the results given above is that they are based on raw scores and therefore reflect changes in the amount but not the proportion of each type of question form. Increased production of questions in post-tests compared to the pre-test must be attributable in part to increased task familiarity. Differences in the proportion of each type of question form used in each test, however, may indicate a change in IL production and an increased confidence and competence in using particular structures (Mackey, 1995). This will be explored further in Chapter 7. A second analysis was carried out using ratio percentage scores, in which each learner's production of each type of question form was represented as a proportion of his or her total production of questions. Wilcoxon Matched-pairs testing was again used on this data, with results being given in Tables 5.29-5.31. In this case, the results reflect whether learners changed in the proportion of each type of question form they used, from pre- to post-test, rather than simply in the total numbers of each type of form. Tables 5.29.1-5.31.1 give the numbers of learners in each group who increased in their production of question forms.

Table 5.29. High group. Results of Wilcoxon Matched-pairs test on ratio percentage scores for proportion of each type of question form produced in pre- and post-tests

		Q3		Q4		Q5	
Test comparison	N	z	p	z	p	z	p
pre-test vs Post 1	13	-1.433	.152	-.874	.382	-2.271	.023*
pre-test vs Post 2	13	-1.293	.196	-.594	.552	-.734	.463
pre-test vs Post 3	12	-.706	.480	-.471	.638	-1.412	.158

Table 5.29.1 High group.Numbers of learners who demonstrated an increase in the proportion of forms used in post-tests compared to pre-test performance

Test comparison	N	Q3	Q4	Q5
pre-test Vs Post 1	13	6	6	9
pre-test Vs Post 2	13	4	6	9
pre-test Vs Post 3	12	5	5	9

Although the majority of learners in this group changed in the proportion of Q5 forms used in post-tests compared to pre-test performance, change was only significantly different in Post-test 1. There were no differences in the proportion of Q3 and Q4 forms used between tests.

Table 5.30. Intermediate group. Results of Wilcoxon Matched-pairs test on ratio percentage scores for proportion of each type of question form produced in pre- and post-tests

		Q3		Q4		Q5	
Test comparison	N	z	p	z	p	z	p
pre-test vs Post 1	10	-.178	.859	-1.362	.173	-1.886	.059
pre-test vs Post 2	8	.000	1.000	-.169	.866	-.700	.484
pre-test vs Post 3	10	-.866	.386	-1.886	.059	-1.682	.093

Table 5.30.1. Intermediate group. Numbers of learners who demonstrated an increase in the proportion of forms used in post-tests compared to pre-test performance

Test comparison	N	Q3	Q4	Q5
pre-test vs Post 1	10	5	7 (less)	7
pre-test vs Post 2	8	4	4	5
pre-test vs Post 3	10	6	8 (less)	6

Note: "(less)" = these learners produced proportionally fewer Q forms in this post-test compared to the pre-test.

For the Intermediate group, there were no statistically significant differences in the proportion of use of any forms between the pre-test and post-tests. However, this group showed a trend towards significance at the .05 level in their production of Q4 forms in Post-test 3 and in their production of Q5 forms in Post-test 1, compared to the pre-test. A majority of learners decreased in the proportion of Q4 forms used in Post-tests 1 and 3 compared to the pre-test.

Table 5.31. Low group: Results of Wilcoxon Matched-pairs test on ratio percentage scores for proportion of each type of question form produced in pre- and post-tests

		Q3		Q4		Q5	
Test comparison	N	z	p	z	p	z	p
pre-test vs Post 1	5	-.944	.345	-1.753	.080	-1.214	.225
pre-test vs Post 2	5	-1.461	.144	-1.214	.225	-.135	.893
pre-test vs Post 3	6	-.943	.345	-.734	.463	-2.023	.043*

Table 5.31.1. Low group. Numbers of learners who demonstrated an increase in the proportion of forms used in post-tests compared to pre-test performance

Test comparison	N	Q3	Q4	Q5
pre-test vs Post 1	5	4	1	3
pre-test vs Post 2	5	3	1	2
pre-test vs Post 3	6	3	3	5 (less)

The learners in the Low group showed no statistically significant differences in the proportion of question forms they used in post-tests with the exception of Q5 forms in Post-test 3. Five of six learners produced proportionally fewer Q5 forms than in the pre-test.

The results found for the proportion of each type of question form used in pre- and post-tests by the different groups are represented graphically in Figures 5.20-5.23. These figures demonstrate indications of positive change on different forms for the three groups, which were also found in a qualitative description of the data, as described in the following chapter, although not necessarily represented by statistical results.

In Figure 5.20, Q3 forms are compared between groups and across tests. The Low group showed most change in the proportion of Q3 forms used from pre-test to post-test, while the High and Intermediate groups remained relatively stable.

Figure 5.20. Percentage of Q3 forms produced in each test

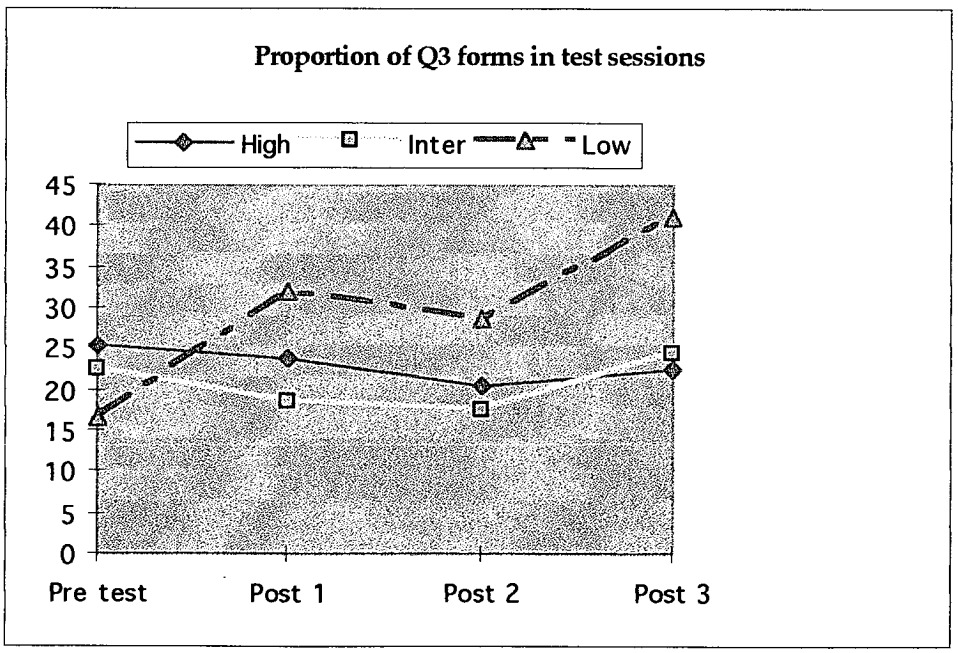
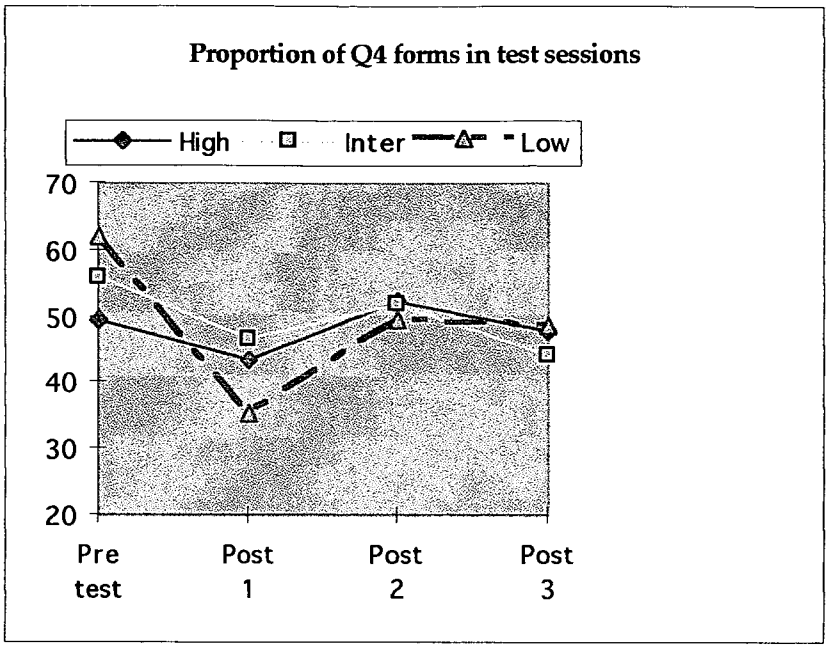


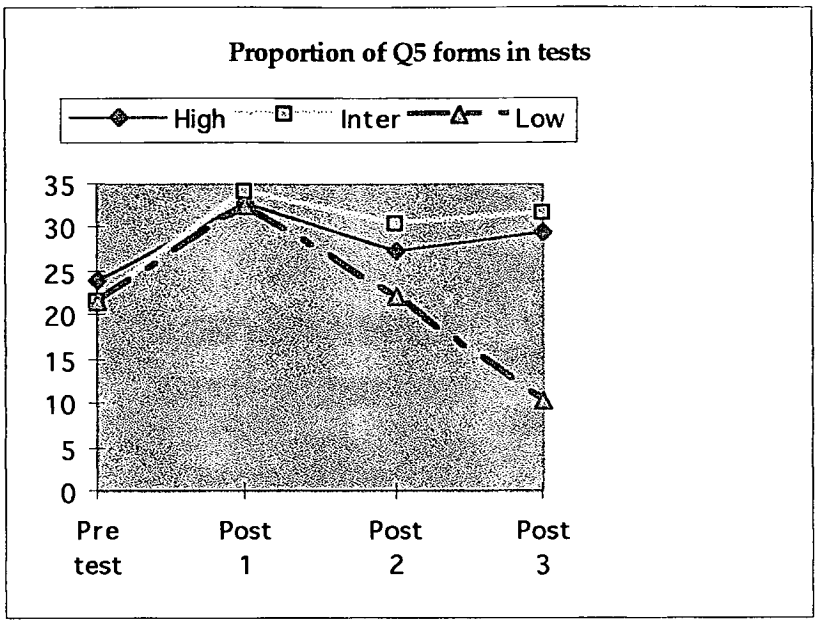
Figure 5.21 provides a comparison of the proportion of Q4 forms used in each test by each group. The Low group showed a decline in the proportion of Q4 forms used in post-tests compared to the pre-test, particularly in Post-test 1. Differences between the Pre-test and Post-test 3 for the higher level groups were not significant.

Figure 5.21. Percentage of Q4 forms produced in each test



In Figure 5.22, the proportion of Q5 forms across tests is compared for each group. The learners in the Low group showed greatest fluctuation in their use of Q5 forms, although all groups varied in the proportion of Q5 forms produced across tests. All groups produced higher proportions of Q5 forms in Post-test 1 compared to the pre-test. For the High and Intermediate group this increase appeared to be sustained across post-tests. The Low group, however, returned to similar proportions of Q5 forms in Post-test 2 as seen in the pre-test and then produced half as many again in Post-test 3.

Figure 5.22. Percentage of Q5 forms produced in each test



Such a comparison of the proportion of question forms used across tests by the different groups suggests indications of sustained change in accordance with the level of the learner. For the High and Intermediate groups there appears to have been greatest change in the use of Q5 forms, while for the Low group, greatest increase in proportion of question form was for Q3 forms.

In summary, when the proportion of each type of question form was compared, the results were quite different to those found for production alone. The proportion of Q3 and Q4 forms did not change significantly between tests for any of the groups. That is, all learners produced similar proportions of Q3 and Q4 forms in each test over time. The High group showed a significant difference ($p<.05$) and the Intermediate group showed a strong trend towards significance ($p=.0593$) in the proportion of Q5 forms they produced in the pre-test and Post-test 1, but not in subsequent tests. Both these groups consisted of learners who had acquired or were ready to acquire Stage 5 forms. The learners in the Low group, in contrast, were lower than Stage 4 and so were not ready to acquire Stage 5 forms. They differed in the proportion of Q5 forms they produced in Post-test 3 ($p=.0431$), with five of six learners producing a

lower proportion of Q5 forms in that post-test than in the pre-test. For this group there was no significant difference in the proportion of other question forms used.

5.4 Conclusion

This chapter has presented the quantitative results of analyses carried out on both the treatment and test data. The first section concerned noticing of recasts by learners. The results of hypothesis testing were presented in Table 5.22.

The second section provided a quantitative analysis of the pre-test and post-test data in order to consider the effects of noticing of recasts on learner's subsequent interlanguage production.

The results indicate that learners notice recasts in the context of task-based interaction, but noticing is constrained by a number of factors. Further, noticing of recasts presented within the processing constraints of learners appears to have an effect on their subsequent production, particularly for higher-level learners.

A qualitative analysis of integration of recasts by three learners is found in the next chapter. This provides a finer grained analysis of changes in learners' interlanguage production over time, linked to noticing of recasts, and this is further explored in Chapter 7 which provides a discussion of the results.

Results II : Case Studies

CHAPTER 6

6.1 *Introduction*

This chapter provides a qualitative analysis of a subset of the data through a presentation of case studies of three learners, selected as representative of each of the groups, as described below. Each learner's interlanguage production of question forms in treatment sessions is described in turn. This chapter seeks to consider the final two research questions:

RQ6 To what extent do learners incorporate recasts of question forms in subsequent production?

RQ7 To what extent do learners integrate recasts of question forms in delayed post-tests?

As discussed in the previous chapter, it was felt that these two questions would be best explored qualitatively rather than quantitatively. In this description of the data, each learner's recall of recasts and subsequent incorporation of recasts in sessions were examined. Recall and incorporation were then compared with each learner's production of the forms in post-test sessions, in order to assess integration of the forms in the interlanguage of the learner.[1]

6.1.1 Sample

A summary of the biodata of those learners whose interlanguage production and development were observed appears in Table 6.1. The three learners were chosen first on the basis of level and L1, so that each

[1] Chapter 7, a discussion of the results, provides a condensed account of the findings presented here, together with examples from other learners. This chapter provides a more detailed analysis of examples, balancing the detailed quantitative analysis given in the preceding chapter.

group (High, Intermediate and Low) and each of the three most common L1 groups in the study (Korean, Japanese and Thai) were represented[2]. Secondly, the learners were chosen on the basis of performance, which was not exceptional: Each was in the mid-range for her group in terms of class performance and pre-test performance in this study. By chance, all three were female. Pseudonyms have been assigned to each learner.

Table 6.1. Biodata of three learners

Group	Name	L1	Date of arrival prior to study Future plans	Age
High	"Ngae"	Thai	1 month prior Marketing career	20-25
Intermediate	"Yuja"	Korean	3 months prior University studies	20-25
Low	"Izumi"	Japanese	1 week prior Unknown	16-19

6.1.2 Outline of case studies

These case studies were designed to provide a more detailed description of the data than the quantitative description alone could provide. Each case study is reported in three sections, which are described below. The three learners reflect characteristics of the three groups in their production of question forms and use of recasts.[3]

First, in order to provide a picture of the learners' interlanguage production, the types of interlanguage forms used by the learner are briefly profiled. This is followed by examples of recasts which illustrate

[2] It is noted that the L1 of over two thirds of the subjects was Korean or Japanese, Thai was the third most common language and was spoken by 12% of subjects.

[3] While each learner displayed individual quirks and did not always perform according to group average, this is characteristic of case studies. As outlined above, learners selected for case studies were considered generally representative.

the types of feedback the learner received specific to her production of question forms. The final section deals with noticing and incorporation. The learner's accuracy of recall of recasts is discussed here in terms of what was and was not noticed by the learner[4]. Finally, incorporation of recasts and integration of the forms in subsequent post-test performance are examined. In summary, each case study description involved the following:

1) Profile of the learner's production of question forms;
2) Examples of recasts;
3) Noticing and incorporation.

6.2 *Case Study 1 : Ngae (High group)*

Ngae was a Thai female student in her mid-twenties, who had been studying English in Australia for one month before participating in the present study. In Thailand she worked in a factory; she came to Australia for two years and planned to return to Thailand to pursue a career in marketing.

6.2.1 Profile of production of question forms

Like many of the students in the High group, Ngae produced both target and non-target-like question forms at all levels. In particular, Ngae produced interlanguage Q3 type forms, that is canonical word order fronted by a question word, in the context of Q4, Q5 and Q6 forms. Examples from treatment sessions are given in Table 6.2 below.

[4] The reader is reminded, that in this dissertation, "noticing" has been assessed in terms of the learner's ability to recall accurately a recast in response to an immediate and unanticipated sound cue. As discussed in earlier chapters, recall is claimed to be a measurement of one level of noticing ; clearly not all noticing is accessed through recall. It is with respect to noticing at the level of recall that the term is used here.

Table 6.2. Examples of Ngae's production of question forms

Question	Non-target-like forms	Target-like forms
Q4	why this is on the table?	where is the other tall tree?
Q5	why the other people write on the contract?	where did he buy the flower?
Q6	why the other people don't do something?	why didn't he change his son?

A focus on task rather than on form may be one reason for this variability. In the following example, the learner appeared perplexed by the story she was trying to unravel and initially produced an interlanguage Q3 form instead of a Q6 form. However, when "pushed" through negotiated interaction (Swain, 1985), this learner did eventually produce the target-like more complex form herself.

Example 1

NNS why the other people don't do something when he saw the gun?
NS don't understand
NNS you don't understand?
NS why
NNS when the other people the opposite
NS when the other person
NNS yeah when the other when the other person ah saw the guy why doesn't he (.) don't do anything he doesn't do anything why doesn't he do anything?

In the second example, Ngae produced a Q4 form in response to communication difficulties.

Example 2

NNS what is he name baby?
NS what what?
NNS what the baby name? what's the baby name?

Thus it appears that this learner was in fact able to produce the TL form when pushed and she produced interlanguage and target-like Q4 and Q5 forms in variation.

6.2.2 Recasts

Ngae received recasts of all types of question forms, as seen in the following examples. [5]

Example 3 *Q4 form in recast*

NNS why why this is on the table?

NS why is there a gun on the table?

Example 4 *Q3 form in recast*

NNS this pic= is is this picture show the dam?

NS does the picture show a dam?

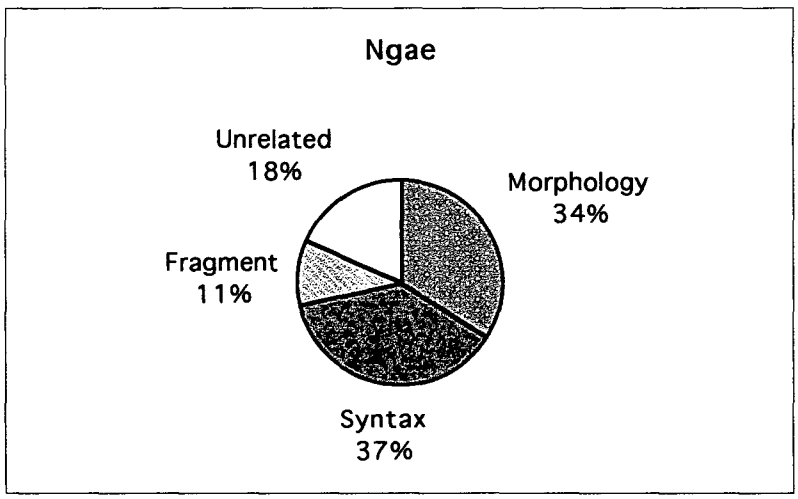
Example 5 *Q6 form in recast*

NNS oh no bears uh huh whys uh why don't= why doesn't ha has bears?

NS why aren't there any bears?

Recasts of the syntax and morphology of questions accounted for 70% of all recasts provided to Ngae. A breakdown of the types of recasts is found in Figure 6.1 below.

Figure 6.1. Types of recasts provided to Ngae



In some cases, recasts may have been a reminder of the correct form to the learner. In other cases, recasts may have provided the target-like version of an IL form, which the learner was unable to produce herself.

Recasts of small grammatical errors such as an incorrect preposition or article, or of lexical items, accounted for 18% of recasts provided to

[5] Examples from the data are given separately unless they occur within the same task and session.

Ngae. This was not typical of the High group who, as a whole, received almost 30% of recasts dealing with errors extraneous to the question form, rather than with errors concerning the morphology or syntax of the question form itself. Examples of these are provided below. In Example 6, *"speak"* was recast as *"say"*, the question form itself was target-like and remained unchanged. In Example 7, only the article was added in the recast.

Example 6 : Lexical item is recast

NNS what happened what happened ah what did the doctor speak with him?

NS what did the doctor say to him? =* *=

NNS =uh huh= what did the doctor say to him?

Example 7 : Article supplied in recast

NNS is she artist?

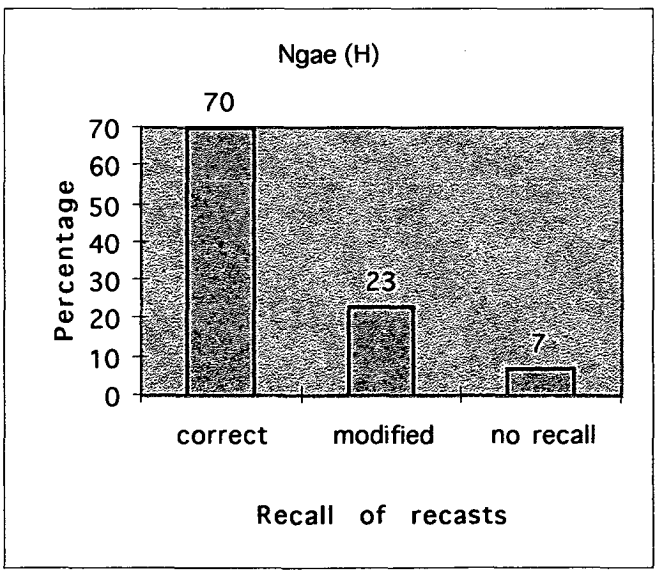
NS is she the artist? * *

NNS is she the artist?

6.2.3 Recall and incorporation of recasts

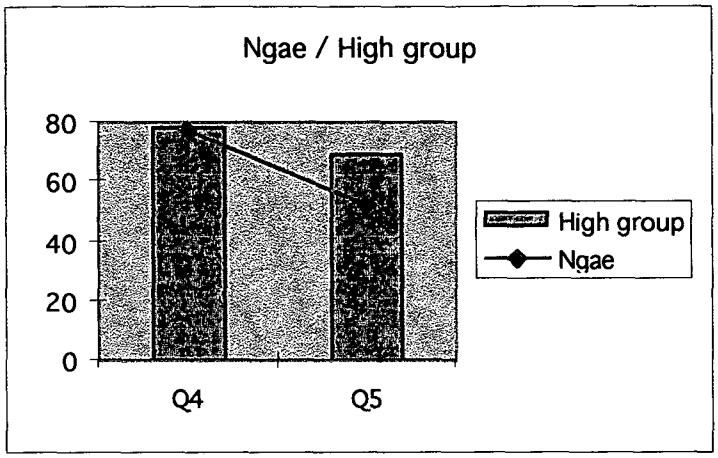
Figure 6.2 provides a picture of Ngae's general accuracy of recall. Typical of the High group, Ngae recalled 70% of recasts accurately and modified recasts in 23% of cases.

Figure 6.2. Recall of recasts by Ngae (High group)



Ngae's recall of recasts of Q5 forms was lower than average for the High group. She demonstrated 77% accuracy on recall of Q4 forms, but only 52% accuracy on recall of Q5 forms[6]. A comparison between the group's performance and Ngae's recall of Q4 and Q5 forms is seen in Figure 6.3.

Figure 6.3. Comparison of recall of Q4 and Q5 forms: Ngae vs High group



It was rare for Ngae not to recall anything of the recast. Even when she did not recall the recast accurately, she did tend to make some adjustments to her original utterance, as seen in Examples 8 and 9 below. In Example 8, Ngae noticed the two lexical changes "person" and "that", but not the syntactic changes. It is interesting in this example that Ngae exchanged *"this person"* for *"the other person"* , a form she had used in her first attempt at the question. Perhaps this is an indication that, in recall, Ngae was at least partially reconstructing rather than mimicking the recast.

Example 8

NNS why ah the other people write on the contact document of ah in the ah the other paper I don't

NS why

NNS yeah why this this people this person ah write on the other paper?

NS ah why does this person write on that paper? =* *=

NNS =yeah= why did why did other (..) why the other person ah write on that paper?

[6]There were only four tokens of recasts of Q3 forms, two of which were accurately recalled.

In Example 9, Ngae did notice syntactic and morphological changes, but not the plural marking on *"thing"*. Curiously, she changed *"how"* to *"who"* which may have been a phonological rather than a lexical error.

Example 9

NNS how many things ah how many thing : is it left? how many thing is it leave?

NS how many things are left? * *

NNS who many thing are left?

It is difficult to discern the source of Ngae's non-target-like forms in many cases. It may be the result of a performance error, that is an error the learner could have easily self-corrected, or it may be a reflection of variability in the interlanguage of the learner. L1 interference may also have been a source of error. In either case, it appears that Ngae correctly recalled a recast when she recognised the difference between her original utterance and the recast, as seen in the following example.

Example 10

NNS why why why ah when no when his wife said with him um when his wife said the baby's name is Tom ah why did he upset?

NS why was he upset? * *

NNS why was he upset?

As noted above, there were also occasions when this learner appeared not to notice changes in the recast, so that inaccuracy of recall may reflect a lack of awareness that her production was non-target-like. Ngae, for example, never produced the non-conjugated form *"have"* in Q5 question forms, the verb was always conjugated, as seen in Example 11.

Example 11

NNS what what colour is she has= does she has?

In addition, Ngae's IL production of the verb as finite is peculiar to the verb *"have"* only; in similar constructions with other lexical items, the non-conjugated form is used, as seen in Example 12.

Example 12

NNS why why why does he go to the hospital?

Although the non-target-like use of *"has"* was recast five times in treatment sessions, Ngae did not notice the change, as seen in Examples 13 and 14 below. In these examples, Ngae did notice the insertion of *"does"*(in both medial and initial positions), and recalled this correctly, but not the change in morphology from *"has"* to *"have"*. Perhaps she recognized and hence noticed the first error but not the second. This issue of recognition and perception will be discussed in more detail in the following chapter.

Example 13

NNS how many how many ah children she has?
NS how many children does she have?
NNS ** how many children does she has?

Example 14

NNS =what is= (.) standing? mm (.) is she has a dog?
NS does she have a dog?
NNS **does she has a dog?

In the fourth treatment session, after two prior recasts of the form (lines 2, 7), Ngae did finally appear to notice the recast of her non-target-like use of "has" (lines 9, 10). She recalled the recast *"does she have"* correctly in the last turn below (line 11).

Example 15 *Three recasts from treatment 4.*

1. NNS what ah what the hairstyle is she?
2. NS what hairstyle does she have?
3. NNS what hairstyle does she has?

[Later turn]

4. NNS what what colour is she has= does she has?
5. NS what colour is her hair? ah her hair is blonde
6. NNS is is she makeup?
7. NS mm does she have makeup?
8. NNS does she has makeup?

[Later turn]

9. NNS what kinds of pet ah does she has?
10. NS she has= what kind of pet does she have? **
11. NNS what kinds of pet does she have?

Ngae did not produce this form again in the fifth treatment session and it was supplied only once in the post-tests, so there was little opportunity to see if this was integrated. In Post-test 2, however, when she did supply the form it was non-target-like. These examples of immediate incorporation relate to Schmidt's hypothesis that a form will not be acquired unless it is first noticed (Schmidt 1990; 1993; 1995; Schmidt & Frota, 1986; see also Gass, 1997). What is seen here is that initally the TL form was not noticed: what the learner incorporated (line 4, line 8) was her perception of the recast, within her IL grammar. Once the form was finally noticed (line 11), there was no opportunity for immediate incorporation and no evidence of subsequent acquisition[7].

Another example of non-incorporation, this time following accurate recall, is seen in Example 16. Here, Ngae used the non-target-like construction *"what has [+noun]"*. Although it was recast and she recalled it correctly, even emphasising the correction, Ngae did not incorporate the recast a few turns later. Clearly, noticing does not necessarily result in immediate incorporation. This will be discussed in further detail, with reference to the findings of other researchers, in the following chapter.

Example 16

NNS what what has the things on the hill= on the house?
NS what things are on the house
NNS **whats ah what things **are** on the house?
[Later turn]
NNS what has anything else in the picture?

In the following example, Q5 forms were recast.

Example 17

NNS yeah Julien ah who is Julia ah go go with?
NS who is Julia going with?
NNS ** who is Julia going with?

[7] I am grateful to Susan Gass for her input on this example

NS her mother
[Later turn]
NNS why why did she cry?
NS why is she crying?
NNS **pardon?
NS why is she crying
NNS why is she cry?

These recasts Ngae did incorporate in later turns, as seen in Example 18.

Example 18

NNS ah who is who is she meet meeting with?
[Later turn]
NNS where is where is ah the eldest eldest : brother?
[Later turn]
NNS where are they going?
[Later turn]
NNS oh why why why does= why is she crying again?

Thus, following the earlier recasts, Ngae produced Q5 forms correctly. In the final example, she corrected herself and correctly supplied the utterance which had earlier been recast for her (see Example 18 above). Whether earlier non-TL utterances were a performance error or an example of IL variability[8], the recasts appear to have triggered an increased accuracy in subsequent turns, that is, Ngae produced more TL forms than previously. Apparently, recasts served as a reminder to this student about the target-like use of the form (see Nobuyoshi & Ellis, 1993).

Variation still occurred, however, and incorporation was not consistent. In the following example, Ngae was provided with a recast which she then incorporated in a later utterance, but also produced incorrectly later:

[8] Ellis' distinction between free variation and systematic variation (Ellis, 1984; see also Tarone, 1983) may be helpful in identifying the source of errors. The relationship between type of error and noticing may be an important topic for further investigation in a future study.

Example 19

NNS why why he surprised look surprised?
NS why does he look surprised? =* *=
NNS =yeah= why did he look surprised?
[Later turn]
NNS why did he look ah upset?
[Later turn]
NNS why why why ah wen no when his wife said with him um when his wife said the baby's name is Tom ah why did he upset?[9]

Samples from Ngae's transcripts demonstrate that learners may produce a form correctly in one turn and incorrectly in the next. These forms seem to be produced in free rather than systematic variation (Ellis, 1984; Tarone, 1983, 1988). Such variation may reflect a destabilisation of her original IL forms as an effect of treatment, and a gradual shift to the use of a TL structure in place of the IL form. Such variation may also be the effect of task. It may be that while concentrating on the task itself, learners are unable to attend to forms that are not as yet automatic for them. In this case inaccuracy may be more common when learners are attending to the task and fail to monitor their production (see VanPatten, 1996).

6.2.4 Summary of Ngae's recall and incorporation of recasts

This learner produced both target-like and non-target-like question forms in variation. Recasts of non-TL forms were accurately recalled or recalled with some modifications in the majority of cases. Although Ngae accurately recalled over 70% of recasts, noticing did not always lead to immediate incorporation. However, where target-like and non-target-like versions of the same question form appeared in variation,

[9] Ngae's incorrect use of the form here relates to difficulties with categorization rather than syntax: she appears to use *"upset"* as a verb rather than an adjective. Further analysis of the data using a lexical functional grammatical approach may reveal more of this learner's interlanguage grammar and development as a result of recasts. I am grateful to Susan Gass for pointing this out to me.

recasts appeared to have triggered an increased accuracy in subsequent turns, as if the recast served as a reminder to the learner of the correct form. In this, Ngae's transcripts were typical of learners in the High group.

6.3 Case Study 2 : Yuja (Intermediate group)

Yuja was a Korean woman, in her early twenties. She arrived in Australia three months prior to taking part in the study. She intended to return to Korea after a year to continue university studies in marketing.

6.3.1 Profile of production of question forms

Typical of the Intermediate group, Yuja produced Q3, Q4 and Q5 question forms, as seen in Table 6.3, but generally with less accuracy than was found in the High group.

Table 6.3. Examples of Yuja's production of question forms

Question	Non-target-like forms	Target-like forms
Q4	why does she surprised?	where is that clock?
	is she smile or?	are they contracting?
Q5	what what does he doing?	why does he want kill him?
Q6	why why he is not still die?	[no examples]

Although Yuja asked many Q4 questions, many of these were non-target-like. In the following examples it is difficult to determine whether Yuja was using a non-target-like auxiliary, or omitting the participle *"ing"* following the verb *"to be"*. For instance *"is she cry"* in Example 20 could be recast as *"does she cry?"* or *"is she crying?"*. The issue of learner intention and semantically contingent recasts will be examined in the following chapter. Further examples are given below. From these examples it is clear that Yuja consistently used an IL structure [auxiliary "be" + noun + non finite verb] to ask questions. This particular IL construction was used seven times in treatment sessions.

Example 20

NNS is she cry?

Example 21

NNS is she go back?

[Later turn]

NNS is he take watch?

Example 22

NNS and they drin= are are they drink water?

There were two turns in which Yuja did produce TL versions, but these were both shortly followed by non-TL versions, as seen in the example below.

Example 23

NNS she is ah is she holding something?

[Later turn]

NNS is she smile or?

Inversion of copula and noun was subject to variation in Yuja's production, as seen in Examples 24-26. In Example 24, the question word fronted canonical word order, typical of Q3 level questions. In Example 26, however, she inverted noun and verb, which was not seen in Example 25, a parallel construction from an earlier session.

Example 24

NNS why she's very angry?

Example 25

NNS what they are?

Example 26

NNS where is= where are they?

One Q4 structure which was consistently target-like in Yuja's production was the form *"is there / are there..."*. As seen in the examples given below, the auxiliary *"be"* was coupled with a dummy subject *"it"* or demonstrative *"there"*, *"this"*. Yuja frequently used this structure in tasks and it may have been formulaic. In fact, of the 27 Q4 forms produced by her in treatment sessions, 18 were of this type (60%). Interestingly, in Example 27 below, Yuja produced the TL form *"are*

they...", following the same pattern as the "*is there/are there*" structure she was so adept at using. This may be an example of a fixed string internalized and adapted by the learner (Weinert, 1995). The issue of noticing of elements within formulaic chunks and fixed strings will be discussed further in Chapter 7.

Example 27

NNS is it is there a balcony? outside?
[Later turn]
NNS ah are they ah high or low?
[Later turn]
NNS is this small or big?
[Later turn]
NNS is there one dam?

As seen in Examples 20-23 above, Yuja appeared to use "*be*" in Q4 structures, where it functioned as a question marker at the head. The auxiliary "*be*" was also used in place of subject where the agent was omitted, such as "*why is surprised?*". Yuja reserved "*do*" for use following a question word in Q5 structures. This is very clear in Example 28. Originally Yuja said "*why is surprised?*", using the auxiliary "*be*" in a Q4 type structure, but changed the auxiliary to "*do*" when she rephrased the question to include the pronoun.

Example 28

NNS why is surprised? why why does he surprised?
[Later turn]
NNS where is where is a Western people?
[Later turn]
NNS who who is he who does he expecting now?
NS who's he expecting * *
NNS ya who's expecting?
[Later turn]
NNS how many kids do= does he have?
[Later turn]
NNS where does he go?

Yuja provides a picture of the emergent nature of acquisition of Q5 forms, as was the case for all learners in the Intermediate group.

Although she produced Q5 forms, she tended to overgeneralise in her use of the auxiliary *"do"* in any Q5 form, as seen in Examples 29 and 30.

Example 29

NNS why does she scare?

Example 30

NNS what does she talk?

In summary, Yuja produced target-like and non-target-like examples of both Q4 and Q5 structures. Q4 questions were target-like only when the verb *"to be"* was the sole verb, e.g., *"what is it?"*. It appears from the treatment transcripts that Yuja was capable of producing Q5 both with the auxiliary *"do"* (e.g., *"what does she do?"*) and *"be"* (e.g., *"what is she drawing?"*), however the latter was very infrequent. Often Yuja overgeneralised and used *"do"* for all cases, or simply dropped the auxiliary altogether (e.g., *"what she doing?"* ,*"why he calling the artist man?"*). Interestingly, dropping the auxiliary only occurred when the verb contained the participle *"ing"* that is, when the auxiliary *"to be"* was required, rather than when the *"do"* auxiliary was required.

6.3.2 Recasts

In treatment sessions, Yuja received 32 recasts of Q4 forms. Insertion of the auxiliary, as in Example 31, occurred six times, most of these in Treatments 1 and 2.

Example 31

NNS why his wife in the hospital?

NS why is his wife in the hospital?

Recasts involving changes to morphology within the question form also occurred six times, as exemplified below. Here the participle was added to the main verb.

Example 32

NNS does= ah is she stand up or sit down?

NS is she standing or is she sitting?

As an aside, Example 32 was one of the few times this student received a recast of her particular IL form [aux + noun + non-finite verb], identified in the previous section.

Yuja was provided with 16 recasts of Q5 forms, 12 of which involved recasts of the auxiliary verb, as seen in Example 33 below. In this example, the auxiliary *"is"* was substituted for *"do"* in the recast and the participle accordingly added to the verb. Such changes were typical of recasts for the Intermediate group.

Example 33

NNS maybe he think something what do you think?
NS what's he thinking? =* *=
NNS =what does oh yeah what does he thinking= what does he thinking?

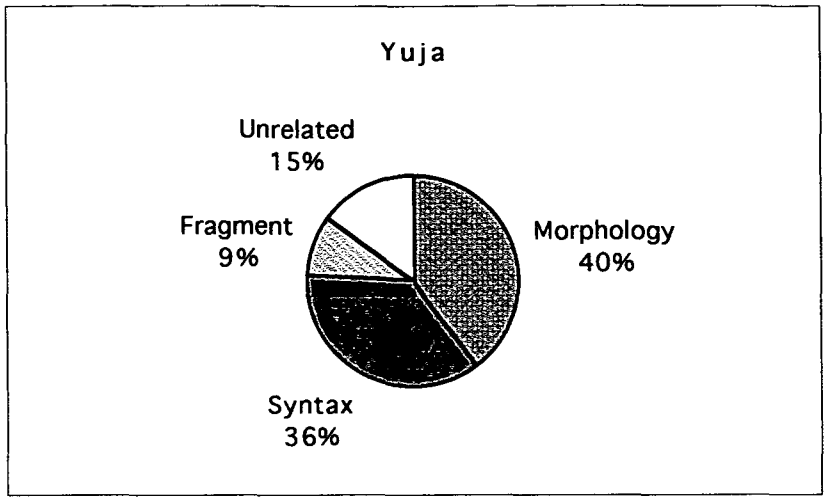
Substitution of the auxiliary from *"do"* to *"be"* also occurred in Q4 structures, as seen below, but to a lesser extent.

Example 34

NNS so does she happy?
NS is she happy? * *
NNS is she happy?

Of the recasts that Yuja received, 40% concerned morphological errors, much higher than was true for the group as a whole (27%), while 36% concerned syntactic changes, lower than average (43%). These data are represented in Figure 6.4.

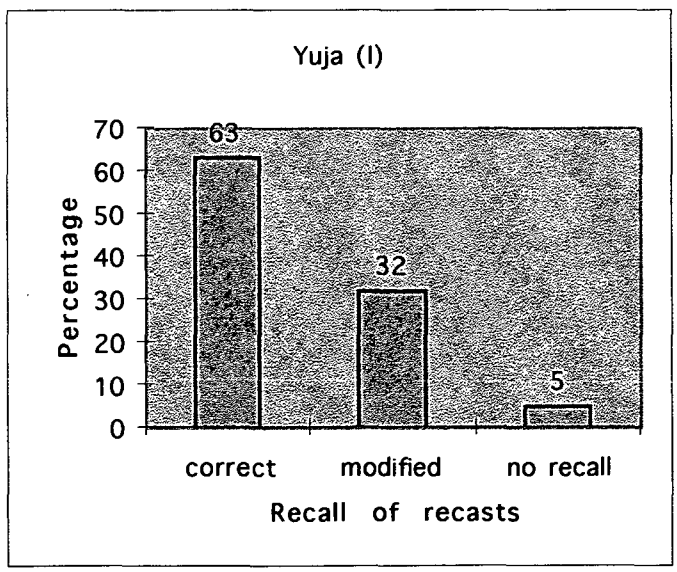
Figure 6.4. Types of recasts provided to Yuja (Intermediate group)



6.3.3 Recall and incorporation of recasts

Yuja received 52 recasts over five treatment sessions. She recalled 63% of them accurately and modified 32% of recasts in recall, as shown in Figure 6.5. In terms of accuracy, Yuja's performance in recall was lower than average for the Intermediate group, which was 73%.

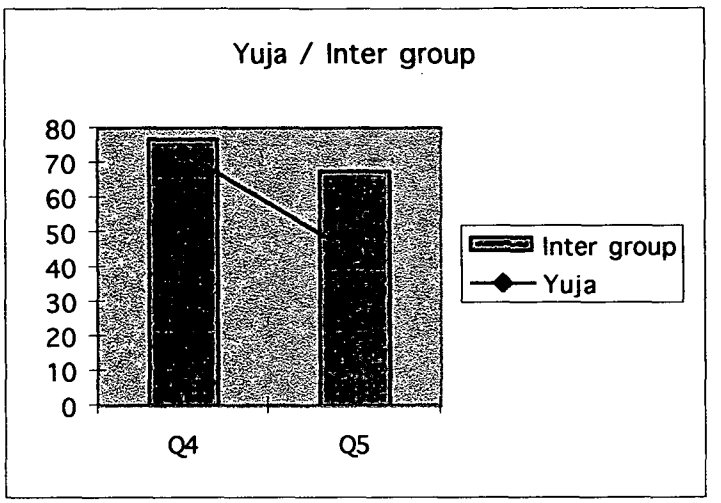
Figure 6.5. Recall of recasts by Yuja (Intermediate group)



When recall of particular types of question forms was compared, Yuja was consistent with the trend of all groups, in that she recalled Q4 forms with greater accuracy than Q5 forms, that is, 73% compared to

44% respectively.[10] Her recall of Q5 forms was relatively poor, as seen in Figure 6.6 which provides a comparison between Yuja's performance and that of the group as a whole.

Figure 6.6. Comparison of recall of Q4 and Q5 forms: Yuja vs Intermediate group



The following examples provide a picture of what Yuja did and did not notice in recasts.

Example 35

NNS	what does she talk?
NS	what is she saying?
NNS	what does she say?

Example 36

NNS	she is ah (.) why her mother ah carry on her?
NS	why is her mother holding her hand? =* *=
NNS	=holding her hand?= why her mother holding her hand?

In Example 35, Yuja recognized the changed lexical item in the recast yet not, apparently, the changed morpheme in the verb or the different auxiliary used. Although she substituted the new word in her recall of the recast, she retained the structure of her interlanguage grammar: no change was made to the auxiliary; and the verb, although different, was not recalled with the participle.

[10] There were only four tokens of recasts of Q3 forms, two of which were accurately recalled.

Similarly, in Example 36, Yuja noticed the changed lexical item, this time including the morpheme which, incidentally, she repeated to herself prior to the recall. Here it is as if the recast provided Yuja with the means of expressing what she was struggling to say in the target language. She accurately recalled this phrase, but failed to notice the change to the auxiliary. Perhaps this points to the orientation of the learner who, perplexed by one aspect of the utterance, that is how to say *"hold hands"*, focused on this aspect. It is this that she recognised in the recast. She did not notice other changes. This will be discussed in further detail in the next chapter with reference to the literature on attention and short-term memory constraints.

Changes to the auxiliary in recasts did not always go unnoticed by Yuja, as seen in the following example.

Example 37

NNS she is happy or= does she happy or sad?
NS is she happy or sad?
NNS is she happy or sad?

This example is interesting in that the learner began with canonical word order, then changed the auxiliary from *"be"* to *"do"* when she rephrased it as a question. In the recast, she was shown that the auxiliary was the same as she had produced previously. This was a shorter recast than those seen in Examples 35 and 36, and it contained a single change. These two conditions of the recast presumably made the change more salient to the learner and easier to recall.

In subsequent recasts, as seen below, Yuja was able to recall both the auxiliary and the gerund, yet dropped the pronoun in her efforts. Recasts of these forms were relatively frequent (30%), and Yuja noticed the change of auxiliary five times out of nine.

Example 38

NNS what what does she doing?
NS what's she doing? * *
NNS what's doing?
[Later turn]
NNS who who is he who does he expecting now?
NS who's he expecting? * *
NNS =ya= who's expecting?

Taken together, Examples 35-38 illustrate the complexity of noticing; some features are noticed some of the time, but not always. As seen in the previous chapter, a number of factors affect noticing. Recast length, number of changes made by the recast and the orientation of the learner, in addition to the readiness of the learner, are all potential factors. These will be considered in further detail in Chapter 7.

Incorporation of recasts following recall was found to some extent in Yuja's production of question forms. In Example 39, Yuja initially produced two questions using the same Q4 IL form identified in the previous section. The second time, she received a long recast which she partially recalled, repeating the first clause but not the second. Example 40 comes from the same treatment session, but a different task. This time Yuja incorporated the morphology of the verb "standing", but did not use it for the verb "sit". Some turns later, she produced a TL question form, fully incorporating the recast. Later again, she returned to the same non-TL question she first produced in the previous task.

Example 39

NNS so is she smile?
[Later turn]
NNS does= ah is she stand up or sit down?
NS is she standing or is she sitting?
NNS is she standing or sit : sit?

Example 40

NNS she is sit down or standing?
[Later turn]

NNS she is ah ah is she holding something?
[Later turn]
NNS is she smile or?

Apparently for Yuja, incorporation of Q4 forms was manifested as a fragile and changeable process, appearing and disappearing within several turns. With respect to integration of Q4 forms in post-test sessions, there was little evidence, as seen in these data from Post-test 2. Yuja persistently used the structure [auxiliary "be" + noun + non finite verb], as seen in Example 41.[11] As noted above, Yuja rarely received recasts of this particular IL form in treatment sessions and clearly there has been no carry over from recasts of other Q4 forms.

Example 41

NNS are they know ah stolen wallet ah wallet?
[Later turn]
NNS so ah are they call the police? call to police?
[Later turn]
NNS is he run away now?
[Later turn]
NNS yeah and then ah is dog just bark or bite?

Returning to the recasts seen in Example 38 above, for further evidence of incorporation, certain developments can be traced in subsequent treatment sessions. In later sessions there appeared to be an increasing accuracy in Q5 forms, yet a variability nonetheless between target-like and non-target-like forms. Example 42 provides a set of questions produced by Yuja over several sessions. The inclusion of the auxiliary appeared to be in free variation at this stage of her development.

[11] Arguably, Yuja's fundamental problem was in differentiating (a) the properties of different verbs such as "*know*" versus "*call*", and (b) aspectual differences in the use of the auxiliary and the participle "*ing*". While beyond the scope of this study, a careful lexical functional grammatical analysis of interlanguage production may prove fruitful in future research in describing interlanguage development.

Example 42 *IL production in treatment sessions*

1. NNS where is her going? where is she going?
2. NNS what he doing?
3. NNS what are they doing?
4. NNS what they do now ah what what they doing now?
5. NNS what they doing= what are they doing now?
6. NNS what clothes is she wearing? wear?

In Treatment 5 the same variability is seen; in Example 43, Yuja initially produced the gerund without any auxiliary where the verb *"to be"* was required:

Example 43

NNS oh are they ah no why why he washing the window?
[Later turn]
NNS shes house her ah hes wife why he clean the house alone?
[Later turn]
NNS why he calling the artist man?
[Later turn]
NNS what kind of pants he wearing?

She also produced the form correctly:

Example 44

NNS what clothes is he wearing?
[Later turn]
NNS what what's she drawing?

This variability was found in all post-tests. Yuja continued to produce both target-like and non-target-like forms, more often the latter, as seen in the examples given below from Post-test 2.

Example 45

NNS what they doing now?
[Later turn]
NNS so:: what are= what is he doing what is he doing now?
[Later turn]
NNS just one oh what did he doing now?
[Later turn]

NNS what they doing now?

Thus it appears that incorporation was short-lived. Integration was not apparent in the post-tests although, given that Yuja produced TL forms in free variation with non-TL forms, it is possible that the latter would eventually give way.

In Post-test 3, three weeks after the last treatment session, Yuja continued to use Q3 type questions in which there was no auxiliary, as seen in these data.

Example 46

NNS and then the one gi= one girl and one boy why they argue?
[Later turn]
NNS one elephant oh what he or she doing now?
[Later turn]
NNS she's cooking now then why she's she's wearing beautiful dress?
[Later turn]
NNS uh huh so after what they do?

In terms of Q5 structures, noticing of recasts did not appear to have had a noticeable immediate or short-term effect.

6.3.4 Summary of Yuja's recall and incorporation of recasts

In summary, it was found that this learner produced Q4 and Q5 forms with less accuracy than most High group learners, that is there were many more IL forms. Target-like Q4 and Q5 forms were found in restricted linguistic contexts, for example used with a particular auxiliary but not another. Recasts of these forms were recalled with variable accuracy.Yuja demonstrated higher accuracy of recall for Q4 recasts than Q5 recasts. The former often involved the addition of the participle *"ing"*, while the latter were often characterised by a change of auxiliary. This learner also recognised lexical items with greater accuracy than morphosyntactic changes. In both her production of

question forms and in her recall of recasts, as described, Yuja was typical of the Intermediate group.

In terms of incorporation and integration of those features she did notice, effects were sporadic and short-lived, both for Q4 and Q5 structures. However, TL forms were produced by Yuja in free variation with non-TL forms both in treatment sessions and in post-test sessions, which suggests that, in time, changes may have become more fully integrated.

6.4 Case Study 3 : Izumi (Low group)

Izumi was a Japanese woman in her late teens. She had been in Australia less than a month before taking part in the study.

6.4.1 Profile of production of question forms

Izumi, like other learners in the Low group, had limited English and generally managed to complete the tasks by depending to a great extent on her native speaker facilitator. Using formula utterances and key words, this learner was able to communicate enough to elicit informative responses from the facilitator and recasts of questions, as seen in these examples from Treatment 5. In Example 47, Izumi produced a Q3 IL form, simply fronting canonical word order with a question word. The form was expanded in the recast, as the interlocutor provided the missing auxiliary verb and article, in addition to further detail. In the second question produced by Izumi, she used the auxiliary *"be"* to indicate a question, coupled with the key lexical item *"danger"*. In the third and fourth examples, intonation alone was enough to indicate the question. Izumi's fragments were fully recast with the required morphology and syntax.

Example 47

NNS why an child ah go out?
NS why does the child go out the window?
[Later turn]
NNS danger danger is here very danger?

[Later turn]

NNS back back ah walk ah now back back walk?

NS is she walking backwards?

[Later turn]

NNS why no walk is he say? why? I mean this is he dangers no walk no walk?

NS oh is he saying it's dangerous?

Occasionally Izumi did produce TL utterances, as seen in Table 6.4, although these were sporadic and often formulaic. Non-target-like questions were most frequent, and generally followed the forms seen in Example 47 above.

Table 6.4. Examples of Izumi's production of question forms

Question	Non-target-like forms	Target-like forms
Q4	why why mother angry?	where is mother?
		near near the pond what is this?
Q5	where mother go?	why : does she cry?
		she is father (..) what do you do?
Q6	why child not together shopping?	[no examples]

6.4.2 Recasts

Recasts provided to Izumi tended to be of fragments as initially, like other members of the Low group, she did not have the linguistic resources to ask the questions she wanted to ask in task-based interaction. Not surprisingly, the Low group received a higher percentage of recasts of fragments than other groups ; 22% compared to 11.7% and 14%, for the High and Intermediate groups respectively. For Izumi, 40% of recasts were of fragments, as was seen above, and in the following example:

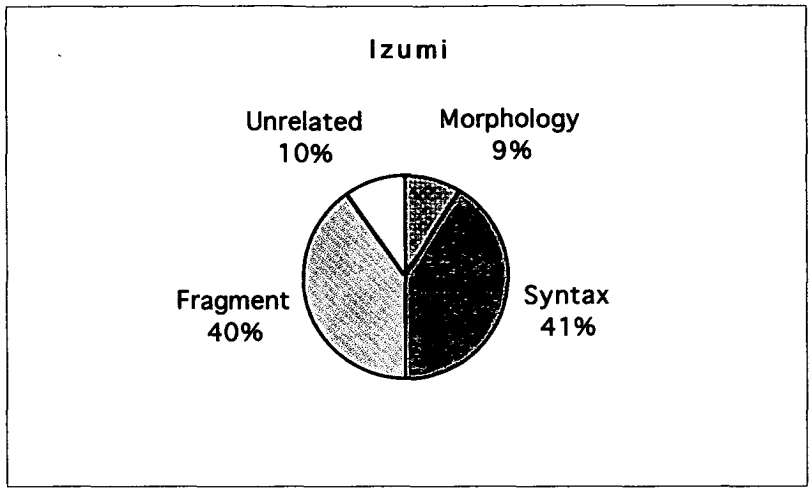
Example 48

NNS sick? um how how long how long um sick?

NS how long has he been sick for?

Changes to the structure of question forms were also the topic of 40% of recasts, while morphology alone was relatively infrequent (9%). This is represented graphically in Figure 6.7.

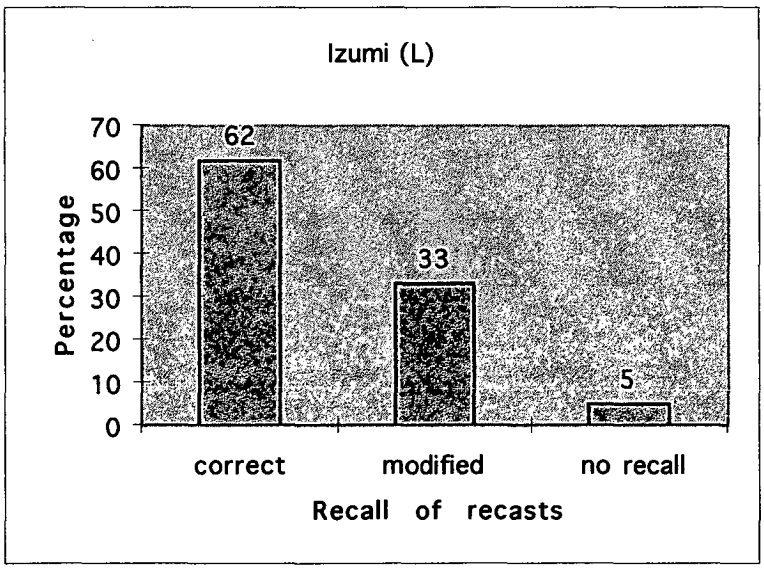
Figure 6.7. Types of recasts provided to Izumi (Low group)



6.4.3 Recall and incorporation of recasts

In general, the learners in this group responded to recasts with fewer correct recalls than learners in other groups. Izumi recalled 62% of recasts with accuracy, and modified a third in recall, as seen in Figure 6.8.

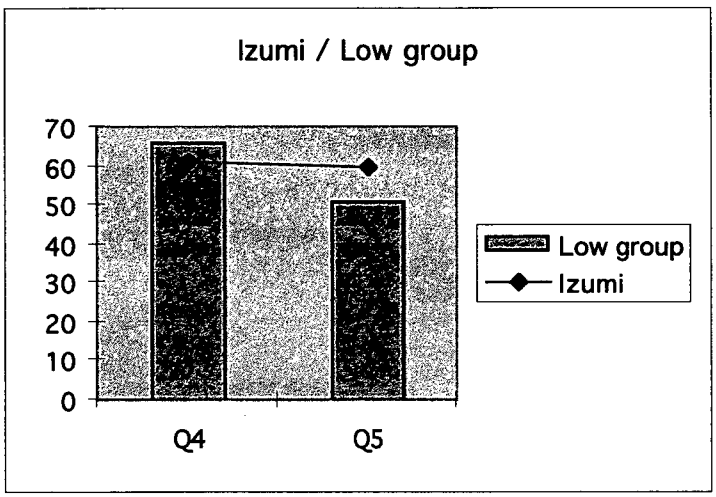
Figure 6.8. Recall of recasts by Izumi (Low group)



In terms of her recall of particular question forms, Izumi performed above average for her group on Q5 forms, recalling them with similar accuracy to Q4 forms, as seen in Figure 6.9. In this, her performance varied also to that of Ngae and Yuja who found recasts of Q4 forms easier than Q5 forms. In part this may reflect different processes

occurring in recall. The High and Intermediate group learners may have been reconstructing the recast in recall, having at least partially processed it syntactically and semantically and compared it in some way to their original utterance. Processing constraints may have limited their ability to attend to all details in the recast. Izumi, in contrast, may have simply mimicked the recast, rather than processed it deeply, so that the complexity of the question form was not important.

Figure 6.9. Comparison of recall of Q4 and Q5 forms: Izumi vs Low group



Where Izumi demonstrated correct recall of forms, there was little evidence of incorporation. While Izumi heard certain forms repeatedly recast and correctly recalled these forms, no incorporation was found in her IL production until the final treatment sessions. In other words, this learner rarely used the forms she noticed in subsequent production. This was typical of the Low group.

One example of incorporation, however, was found in Treatment 4 and appears below. Here Izumi learned a new form, having several opportunities to try it out and being provided with four recasts in succession:

Example 49

1. NNS ahh left or right a man clothes : uh what what is clothes?
2. NS what clothes=
3. NNS =what clothes
4. NS =does he have? * *

5. NNS what clothes does he have?
   [Later turn]
6. NNS shoes what is shoes?
7. NS what shoes does he have? * *
8. NNS what shoes does he have?
   [Later turn]
9. NNS what does he glasses?
10. NS does he have glasses? * *
11. NNS does he have glasses?
    [Later turn]
12. NNS front of man what does she clothes have?
13. NS what clothes does she have? * *
14. NNS what clothes does she have? does she have?

Izumi recalled the recast accurately each time and, as seen in line 3, she appeared to be aware of her mistake as she repeated the NS facilitator's recast even as the NS was talking. The second time she repeated her IL form and received the same recast (line 7). The recast was a complex one, being long and involving more than three changes. Yet Izumi appeared to have processed the changes at some level (line 8). In her third attempt she incorporated the use of *"does"*, replacing her use of the auxiliary *"be"*, yet retaining her original IL structure (line 9). This time she received a recast of a different structure, but it confirmed her use of *"do"* as an auxiliary and maintained the addition of the verb "have", collocated with clothing (line 10). In Izumi's fourth attempt she included all the components of previous recasts, but in the wrong order (line 12). Essentially, she repeated the IL structure of her previous question [*wh* question + *"do"* auxiliary + pronoun + noun], but added the verb *"have"*, apparently noticed in recasts. Noticing did finally lead to intake as, in a later turn, Izumi produced the form correctly without help. She did so in five separate turns:

Example 50

NNS what does she= what does= what clothes does he= does she have?
[Later turn]
NNS um what does she= what does= what what shoe what does she sh= what does shoes have does she have?
[Later turn]

NNS what clothes does she have = does she have?
[Later turn]
NNS um what what pant pant or shi does she have does he have?
[Later turn]
NNS what shoes does he have?

By the fifth time she was much more confident in using the form. Apparently, Izumi noticed the form in the recast, as she was able to recall it. The form was incorporated in later utterances, although not always in a target-like way. Eventually Izumi did make use of the target-like form. Unfortunately there is no evidence in the post-tests of Izumi's use of this form again. Rather, she favored Q3 constructions, in which canonical word order was fronted by a question word. This is not surprising, however, as Izumi was at Stage 3 in the pre-test.

While the above sequence may be an example of noticing a recast, there were many other situations in which the recast form was recalled correctly (particularly if the utterance was a short one), yet never incorporated. In part, this was because the use of the particular form was not obligatory and so there was no opportunity to see if it were used or not. This was not true of all cases. Evidently, not all noticing leads to intake. The relationship between noticing and intake is of primary concern in this qualitative analysis and will be discussed in detail in the following chapter.

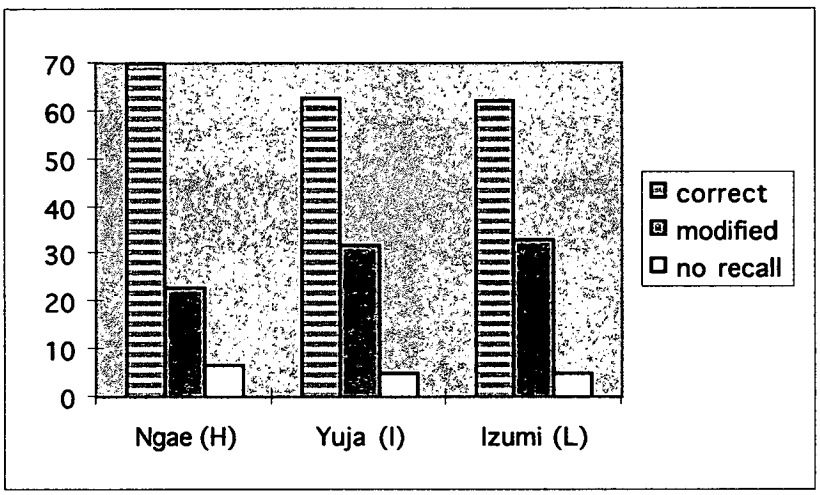
6.4.4 Summary of Izumi's recall and incorporation of recasts

Izumi produced few Q4 or Q5 forms. She relied heavily on formula questions and frequently received recasts of fragments such as *"how long sick?"*. Izumi recalled almost two thirds of recasts with accuracy and modified a third. However, there was little evidence of incorporation of recasts. A few examples of incorporation did occur after frequent recasts of the same form. In these cases incorporation of the question form appeared to be as sequences, with optional slots such as *"what X does he/she have?"* Post-tests did not provide any evidence of integration of such forms.

6.5 Summary : comparison of three learners

All three learners followed the same pattern in terms of the proportion of recasts which were recalled correctly, modified in some way or not recalled at all, as seen in Figure 6.10. The latter accounted for less than 7% for all learners. Ngae, of the High group, outperformed the other two learners who were surprisingly similar in performance.

Figure 6.10. Percentage accuracy of recall : Comparison of three learners



The High group learner, Ngae, recalled recasts with higher accuracy than the other two learners. She appeared to benefit from noticing of recasts through an increased accuracy in her production of question forms. It was, however, difficult to see to what extent this was sustained over time. Ngae produced both TL and non-TL forms in free variation and incorporation of recasts was not consistent from one turn to the next. The same was true of the integration of forms in post-test sessions.

Yuja recalled accurately only 63% of recasts. This was not an indication, however, that 47% of recasts were not attended to at all; rather, that noticing was partial. The examples given in this case study suggest that where recasts contained three or more changes, Yuja tended to notice some but not all changes. Lexical items appear to have been more readily recalled than changes to the question form itself. Where changes to morphology and syntax were noticed by Yuja in recasts, these were

not immediately incorporated. Similarly, short-term effects in post-tests were not clearly visible. From the data available, Yuja's use of recasts in subsequent production appeared to be sporadic and short-lived.

Izumi, as a Low-group learner, had fewer linguistic resources available as she struggled through each task, depending heavily on the cooperation of her NS interlocutor. Recasts were most frequently of fragments and contained many changes. Even so, Izumi's recall was as high as Yuja's and similar in that she, too, recalled elements within a recast at times, if not the whole recast. From the data, it appears that recasts had greatest effect when a particular form was consistently recast and Izumi had many output opportunities to practise the form. In general, noticing recasts did not result in immediate incorporation or short-term integration.

6.6 Conclusion

In conclusion, these three case studies suggest that recasts were noticed by NNSs in the context of task-based interaction, but not always in their entirety. Some aspects (whether morphological, syntactic or other) were noticed over others. In addition, incorporation, although evident, was not consistent. Learners tended to produce both TL and non-TL versions of a structure in free variation, in treatment sessions and in post-test sessions.

There are several caveats to the findings of these three case studies. First, only the incorporation and integration of recasts of question forms were investigated. Although the learners may have noticed and incorporated lexical and phonological changes to their non-TL utterances, these were not noted. Secondly, measurement of incorporation was limited to the learners' spontaneous production of the targeted forms in the context of the task. The same was true in measuring integration of forms in the post-tests. At times, incorporation may not have been seen simply through lack of

opportunity. The use of treatment and post-test tasks carefully matched in terms of content, or individual tailor-made post-tests (see for example Kowal & Swain, 1994) could have provided a more satisfactory picture of the IL of these learners. Finally, although the learners presented in the case studies were in many respects typical of their group, there was clearly great individual variability, both in the extent to which learners recalled recasts and in the use they made of them. Some learners appeared to have a stronger phonological short-term memory than others and some were more concerned with accuracy than others.

The following chapter discusses the quantitative and qualitative results, described in this and the previous chapters, in the context of the literature and the contribution this study makes to our understanding of the relationship between noticing, intake and integration.

Discussion

CHAPTER 7

The previous two chapters have detailed the results of this study of learners' noticing of recasts. The results suggest that learners did notice recasts provided to them in the context of task-based interaction. The extent to which learners were able to recall recasts in response to an immediate cue was constrained by a number of factors, and these factors form the basis of discussion in this chapter. This is followed by comments on the use of recall as an instrument for measuring noticing in the context of oral interaction. After an analysis of constraints on learners' noticing of recasts, this chapter considers the incorporation and integration of those recasts in subsequent production, as described in the previous chapter.

7.0 Outline of the discussion

The organisation of the discussion is based on the research questions and hypotheses provided in Chapter 3, summarised below and throughout the chapter within each section for convenience. It begins with a discussion of the results found for each hypothesis, providing an interpretation of the results with regard to previous empirical and theoretical work in the fields of SLA, FLA and cognition. An outline of the major topics for this chapter is given below.

Overview of the chapter

Discussion of the results of hypothesis testing.

Discussion of the ways in which the following variables were found to constrain accuracy of recall :

7.1) Level of the learner;

7.2) Type of question form;

7.3) Length of the recast utterance;

7.4) Number of changes made to the trigger in the recast utterance;

7.5) Types of changes made in the recast utterance.

Further analysis

7.6) Other variables affecting recall;

7.7) Discussion of the use of recall as an instrument for measuring noticing.

Discussion of qualitative analysis

7.8) Evidence of incorporation and integration of recasts in the immediate and short-term production of the learner.

Discussion of the results of hypothesis testing

7.1 Level of the learner

The first hypothesis tested concerned the level of learners, where level referred to the developmental stage of the learner as identified by his or her production of question forms (Mackey, 1995; in press; Pienemann & Johnston, 1987).

> H1: Accuracy of recall is correlated with the level of the learner, such that the higher the level of the learner the greater the accuracy of recall: High > Intermediate > Low.

Hypothesis 1 was partially supported. An advantage was found according to the level of the learner, so that High and Intermediate learners were more able to recall recasts than Low learners. No difference was found between the higher-level groups[1]. High and Intermediate learners had acquired Q4 prior to treatment sessions, while Low learners had yet to acquire these forms. It may be that readiness to acquire certain types of question forms (Pienemann, 1984; Pienemann & Johnston, 1987) constrained the noticing of particular forms.

7.1.1 Processing biases

It was intriguing to find in the data examples in which the learners, in recall, reinterpreted the recast according to their own IL grammar. This is illustrated in Example 1 below. The NNS' struggle to express her question was resolved by the NS' recast. The NNS modified this recast in her recall, maintaining the lexical item *"carry,"* but modifying the syntax and morphology. She used a Q3 form in which the question word was placed before canonical word order. This pattern then occurred a second time. This time the NNS initially used a formulaic question *"what are you doing?"*. In response to the recast she reformulated the question in a Q3 form, again using a question word to front canonical word order,

[1] "Higher-level" will henceforth be used as a term to describe both the High and Intermediate groups together, in contrast to the Low group.

ignoring the use of inversion in the NS' recast. Apparently this learner noticed the recast, spontaneously repeating it, yet each time, she reformulated it according to her own IL system.

Example 1 *KorF*

NNS does does he uh the hand uh on the hand ah what what

NS what is he carrying?

NNS yeah what he is carry?

[later turn]

NNS what are you doing what are you doing the pic uh the boys in the picture?

NS what is he doing?

NNS yeah what he's doing?

Such examples may reflect that learners are biased to some degree by their curent IL knowledge to the input they hear. This bias modulates the learner's apperception[2] of the recast (Gass, 1997; White, 1987). As White (1987) notes:

> ... the learner's current grammar ... acts as a filter on the input... That is, the learner rejects input which cannot be interpreted in terms of his or her current knowledge, or *modifies it so that it can be dealt with.* (italics added) (p. 97)

In the above example the learner, who was identified as being at Stage 3, apparently did not notice the inversion of subject and auxiliary required in Stage 5 question forms. Both Gass (1997) and VanPatten (1996) in their models of second language acquisition and input processing, suggest that what becomes intake for learners is constrained by their apperception of the input. Various factors regulate learners' apperception of input including attention, frequency and prior knowledge (Harley, 1994; Gass, 1997) as well as processing biases (VanPatten, 1996).

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[2] Apperception describes the process by which prior knowledge or experience regulates learners' detection (see Gass, 1997 for discussion specific to SLA; James, 1890; cited in Ashcraft, 1994).

Writing specifically of a bias to process forms of communicative value and least redundancy over other forms, VanPatten (1996) claims that "learners' processing of input results in a reduced and sometimes altered subset of the input data" (p. 134). Similarly, Gleitman, Newport and Gleitman (1984), considering FLA, argue that:

> the effects of maternal speech are significantly modulated by biases of the child learner about how to store and manipulate incoming information and about the allowable structures and contents of a language" (p.44) (see also Newport, Gleitman, & Gleitman, 1977).

In terms of knowledge base, bias of the learner may be conditioned by her own IL grammar and potential immediate developments beyond it. Following the work of Pienemann and Johnston (1987), it is argued that those learners who were already at the developmental level to be able to produce the recast question form would be expected to have no difficulty recalling the recast. Those who were not at that level would be expected to show greater inaccuracy in recalling the recast. This is further explored below with reference to particular question forms.

Such an explanation for the difference in performance between the higher-level groups and the Low group provides support for the notion of "readiness" and of the implicational heirachy within the development of question forms in ESL. (Pienemann, 1984; 1989; Pienemann & Johnston, 1987). That is, that a learner's capacity to acquire a structure is dependent upon their developmental readiness to acquire it and stage of aquisition presupposes acquisition of the previous stage. Pienemann argues that the learner must have the appropriate processing mechanism in order to acquire a given structure; for example, he or she must be able to process inversion in Q4 forms in order to manipulate subject and verb. Here it is suggested that readiness to acquire a structure affects the learner even noticing that structure in the input, a step argued by most to be requisite to acquisition (Gass, 1991; 1997; Schmidt, 1990).

The finding that there was little difference between the High and Intermediate learners is intriguing in that these two groups were distinctly different in other ways, such as general fluency and comprehension. Perhaps noticing of recasts of question forms is not linked to other aspects of language development, but is tied very much to the morphosyntactic developmental level of the learner's IL.

While it is suggested that readiness to acquire a form affects noticing, clearly other factors can override this. Even Low learners were able to retain in working memory very short recasts as seen in Example 2. Although a Stage 4 form was provided in the recast, a form theoretically beyond the level of the learner, it was easily recalled.

Example 2

NNS where the child?

NS where is the child?

NNS where is the child?

It appears that where the recast is sufficiently long for the learner to have to reconstruct it to some degree, that is, where the whole utterance cannot accurately be represented in working memory, recall is affected by reliance on long-term memory and the learner's own IL system. The effect of length of the recast, in addition to other factors affecting recall, are discussed further below. It is sufficient here to note that the level of the learner is not the sole determining factor in terms of what is and is not noticed.

Perhaps such short chunks, as seen in Example 2, form the basis for future development. The possibility of long-term rather than short-term effects being the "real" outcome of interactional modifications has been suggested by previous research (Brock, Crookes, Day, & Long, 1986; Lightbown, 1994; Mackey & Philp, 1998). While the effects of interaction

may not be seen in the short term, they may be stored as a database for the future.[3]

In conclusion, learners' apperception of the input is regulated by various factors which include certain processing biases. Both the learners' IL grammar; their prior L2 experience and developing L2 processing capacity, in addition to a preference to their attending to meaning over form, appear to affect what becomes intake for the learner.

7.1.2 Familiarity with the input

A second explanation for the disparity between groups in accuracy of recall may lie in the degree to which the L2 input given is familiar to them. Compare, for example, the responses of these two learners to recasts of their non-target-like utterances;

Example 3 Inter learner KorF

NS he's selling the house

NNS why he is sell the house?

NS why is he selling the house? * *

NNS why he : is : selling the house?

Example 4 High learner IndoF

NNS why they want to sell to the house?

NS why do they want to sell the house? * *

NNS why : do they want to sell the house?

In the first example, the Intermediate learner constructed a question using the language provided by the NS in the preceding utterance and she omitted the morpheme previously provided with the verb. In the recast a Q5 form was provided, the auxiliary and subject were inverted and the morpheme was repeated in the verb. Following the recast, it was the morphological change that the NNS apparently noticed; now hearing

[3] In order to investigate this issue of the possible long-term effects of interaction, a longitudinal qualitative study in which external exposure was also monitored would be required. This was beyond the bounds of this dissertation. I thank Ron Leow for his input here.

it for the second time, she did not pick up the syntactic changes made. Her recall was marked by pauses and hesitation, she appeared to be having difficulty repeating the recast from working memory and she did not manage to recall it accurately.

In the second example, the High learner recalled with accuracy a rather lengthy recast in which there were two changes: one the insertion of the auxiliary *"do"* and the other the deletion of the particle *"to"* after *"sell"*. At other times this learner produced the auxiliary in Q5 question forms such as these in a target-like way, and this was perhaps a performance error on her part. She recalled the recast accurately. Arguably, familiarity with the form allowed her to focus on other corrections in the utterance of which she may have been unsure initially.

The link between familiarity and recall has been seen in other contexts. FLA research suggests that children responding to recasts are more likely to imitate linguistic items emerging in their own IL than completely novel ones, on the one hand, or already acquired ones on the other (Bloom, Hood & Lightbown, 1974).

In a comparison of Finnish children's repetition of Finnish and English-sounding pseudowords, Service (1992) found that children could repeat Finnish pseudowords with almost 100% accuracy but had difficulty with English-sounding words. Service suggested that "the familiar sounding pseudowords created better-quality or longer-lasting traces in the phonological input store and were therefore easier to repeat" (p. 44). The same may be true of these adult learners of a second language.

One of the reasons why the learners in the Low group had greater difficulty in recall may have been a lack of familiarity with the lexical items encountered in recasts. In other words, they lacked previous L2 input and hence traces in long-term memory of words in the recast. This is also supported by the findings of L1 research. Cowan (1993), for

example, reports on a study in which subjects were more successful in recall of English words over nonsense words (Hulme, Maughan, & Brown, 1991), and concludes that "one's long-term lexical familiarity with the material to be activated makes a big difference in working memory tasks (p. 166)." Although the research outlined above concerns lexical familiarity, it is suggested that the same mechanisms hold for morphosyntactic forms (see N. Ellis, 1997)[4].

In summary, recognition of units within a recast may have contributed to increased accuracy according to the level of the learner: the higher-level learner having the advantage of familiarity with the input.

7.1.3 Working memory

A third explanation, clearly related to the first two, concerns the constraints of working memory. As working memory is limited in capacity, learners who have a larger store of L2 data and greater automaticity in comprehension and production are advantaged. For the Low learner, less is automatic and attentional resources may be taken up processing meaning alone, rather than form itself (VanPatten, 1996). A lack of automaticity with subskills such as articulation and word production may preclude the allocation of processing resources from other aspects of speech processing.

7.1.4 Summary of the effect of the level of the learner

To summarise, three explanations are provided for the disparity between High and Intermediate learners on the one hand, and Low learners on the other, in recall of recasts.

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4 N. Ellis (1997) argues that much of language, lexical, phonological and morphosyntactic, both in L1 and in L2, is acquired through implicit analysis of memorised sequences of language. Arguably, the Low learners did not yet have this resource of sets of sequences built up in long-term memory.

The first explanation concerns the notion that we perceive input according to particular biases. Low learners may not recognize particular structures (such as Q5 forms, requiring inversion) beyond their current level of development. Elements which do not fit into their own IL system are ignored, that is, not detected or apperceived by the learners.

A second explanation suggests that familiarity with the input advantages higher-level learners in that they have stronger links with the language provided, and are assisted through long-term memory with accurate recall. The recast in this case reiterates what they have heard previously. For Low learners, the structure of the recast may be novel to them and hence more difficult to recall with accuracy.

The third explanation lies in the limited capacity of attentional resources. The increased automaticity that comes to the higher-level learners with practice allows attentional resources to be allocated to processing of grammatical features in the input, beyond meaning alone.

These three explanations underpin the discussion of other constraints on accuracy of recall. Adding to Long's proposal (1997) that "environmental contributions to acquisition are mediated by selective attention and the learner's developing L2 processing capacity" (p. 414), it is suggested that attention may be *oriented* by the learner's relative familiarity with the input. In other words, the learner's apperception of the input, including interactional modifications, is influenced by prior experience, by L2 representations in long-term memory (Gass, 1991; Osborne & Whittrock, 1983; cited in Gass, 1991).

7.2 Type of question form

As discussed above, the results indicate a difference between higher-level learners and Low learners in terms of accuracy of recall. It was argued that

this might in part be explained by developmental processing biases in the learner. Hypothesis 2 reflected the expectation that accuracy of recall would correlate with the type of question form.

> *H2* Learners will show a significantly higher percentage of correct recall for question forms that are within their level than for question forms that are beyond their level.

Hypothesis 2 was partially supported. Partial support was due to a lack of data concerning Q3 forms. To a limited extent low-order question forms were recalled with greater accuracy than higher-order question forms. Q5 forms were recalled with less accuracy than Q4 forms. What is curious is that Q3 forms were also recalled with less accuracy, whereas the opposite was expected. This is, however, more likely to be a factor of paucity of data than an indication of true difficulty with these forms. There were few occurrences of Q3 forms in the data; the majority of learners receiving fewer than five recasts of Q3 forms over five treatment sessions and often as few as one or two.[5] Thus, accuracy of recall of Q3 forms was difficult to assess reliably on the basis of so few tokens.

7.2.1 Recall of Q4 forms

The greatest number of recasts for all groups contained Q4 forms. In a post-hoc analysis, these were further investigated in the data with regard to whether learners found certain types of Q4 forms easier to recall than others. A distinction was made between yes/no questions such as *"is it a big alien?"* and wh-questions such as *"where is the alien?"*, both Q4 structures. The rationale for this distinction comes from theoretical work in FLA and SLA research, outlined below.

[5] Mackey & Philp (1998), similarly, found a correspondence between incidence of question form types in recasts and development in learners. They found a high incidence of Q4 and Q5 forms being recast and, correspondingly, increased production of these forms by learners ready to acquire them.

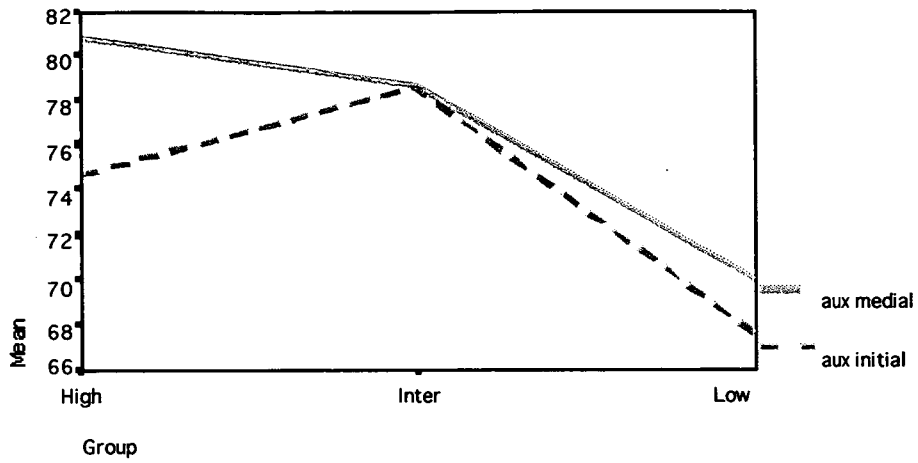
A study by Newport, Gleitman and Gleitman (1977) revealed a high correlation between maternal yes/no questions, in which subject and auxiliary are inverted, and the child's development of the verbal auxiliary. Gleitman, Newport and Gleitman (1984) conjectured that the acquisition of the auxiliary in this context was favoured by its initial position; it was stressed and non-contracted. Further, they suggested that children were biased to attend to the initial components of utterances.

Characterising stages of development in adult ESL question formation, Pienemann and Johnston (1987) argued that attending to the beginning and ends of a string of elements, or a sequence of words, was an ability acquired by learners earlier than that of attending to medial elements, a processing constraint claimed to be universal (Clahsen, 1980; Meisel et al., 1981). This ability allows learners to manipulate initial and final elements in the string, giving rise to Stage 3 type questions (e.g., *"do you like icecream?"*).

On the basis of this research in FLA and SLA, it was considered possible that learners would find recasts which affected the beginning of an utterance easier to recall than recasts of later components. However, this was not the case. When separated in the data, there was no significant difference in terms of accuracy of recall ($p<.342$, see Appendix 7.1 for statistical results) between the two types of Q4 questions.[6] Figure 7.1 compares recall of Q4 forms in which the auxiliary was initial (e.g., *"is there a horse?"*) with those in which it was medial (e.g., *"what is it?"*). As seen here, differences between the two were small. Additionally, there was great variability between individuals.

[6] These figures compare recasts in which the two types of Q4 forms; auxiliary initial and auxiliary medial, feature. The auxiliary itself is not necessarily the change made in the recast.

Figure 7.1. Comparison of percentage of correct recall of Q4 forms: initial versus medial auxiliary



While the hypothesised bias to attend to the beginnings and ends of utterances is not supported in these data, further exploration with a larger data set and a finer measurement of noticing may prove otherwise. In addition, other biases such as the tendency to focus on meaning may be more crucial (Peters, 1985; Harley, 1994). That is, learners may process (notice) meaning-bearing units before grammatical units. VanPatten (1996) claims that

> the relative communicative value of a grammatical form (...) plays a major role in determining the learner's attention to it during input processing and the likelihood of its becoming detected and thus part of intake (p. 24).

It may be that this particular "communicative" bias is more in evidence in these data than a bias to attend to initial units.

7.2.2 Recall of Q5 forms

The fact that Q5 forms were recalled with less accuracy than Q4 forms lends some support to the notion of readiness and the work of Pienemann and colleagues (Pienemann, 1984; Pienemann and Johnston, 1987; Pienemann et al. 1988). It appears that, not only are learners unable to acquire forms they are not developmentally ready to acquire

(Lightbown, 1998; Mackey, 1995; Pienemann, 1984; 1989), but in some ways readiness may modulate learners' noticing of form in the input.

7.3 Length of the recast utterance

The third variable tested was the length of the recast, as measured by the number of morphemes. Long recasts were defined as being six or more morphemes in length.[7]

> *H3* Accuracy of recall will be higher for shorter recasts than longer recasts.

Hypothesis 3 was supported. Results indicate that the length of the recast affects the learner's ability to recall the recast. The fact that all learners, irrespective of level, found shorter recasts easier to recall, suggests that this variable is a factor of the limitations of working memory rather than one linked to developmental level.

It is important to establish that learners do notice recasts and are able to rehearse such L2 input in working memory. Logically, if learners make comparisons between L2 input and the IL (Gass, 1991; 1997; Gass & Varonis, 1994), and specifically, between recasts and their own IL production, they must first notice the differences and process them sufficiently for long-term memory storage. Cowan (1988 :66) suggests that as auditory memory can retain input for a limited time, this input is available for comparison of utterances, just as it is for problem-solving tasks. Further, N. Ellis (1997) claims that morphosyntactic and other aspects of language are acquired through implicit analysis of memorised sequences from L2 input. His assertion that "the repetition of sequences in working memory results in consolidation of long-term

[7] Long recasts rarely exceeded 10 morphemes, the majority of recasts were 6-7 morphemes in length. See section 3.2.2 for motivation behind distinction between long and short recasts.

representations of this sequence information "(p. 113) reflects the importance of auditory memory in language development.

7.3.1 Constraints of working memory and retention of recasts

Working memory appears to offer a brief window of time in which data may be retained through rehearsal (Baddeley, 1986; Cowan, 1988; 1993; 1995; N. Ellis, 1997) and the results given here on length of recast reflect that phenomenon. As outlined in Chapter 2, limits of time and attentional capacity govern the retention of input in working memory. The number of units of information, the rate of rehearsal in working memory (and hence the length of the utterance), as well as the rate of decay in the phonological store, all affect accuracy of recall (Baddeley, 1986; Cowan, 1992; Service, 1992). Rate of decay will change depending on the competition for attention by incoming input that replaces what was just heard. Thus changes in the recast are in competition for the attention of the learner with other incoming data, not to mention other processes engaging the learner's attention at the time. At times a learner may simply not be orienting his or her attention to what the NS is saying, as seen here in Example 5. However, such examples were uncommon in the data, occurring as little as five times in treatment sessions.

Example 5 *RusM*

NNS what they will do?

NS what will they do? * *

NNS what I didn't listen

The relationship between working memory and language acquisition is discussed in a variety of studies (see N. Ellis & Sinclair, 1996 for review). Short-term phonological store has been shown to be important for the learning of new words (Baddeley, Papagno, & Vallar, 1988; Cowan, 1995). These studies suggest that short-term phonological store, through processes of rehearsal, allows input to remain in working memory potentially long enough for subsequent comparison and consolidation in

long-term stores. N. Ellis (1997) argues that the process of rehearsal and subsequent retention in long-term memory of L2 sequences may also be important for morphosyntactic development. He cites evidence from FLA and correlations found between phonological working memory and grammatical ability (Adams & Gathercole, 1995; Speidel, 1993), in addition to evidence from dyslexic children in whom reduced working-memory span and a corresponding restricted acquisition of syntax have been found (Scarborough, 1991).

As it is a factor of working memory, length of the recast is a variable that inter-relates with other variables. These are discussed below.

7.3.2 Length of recast and level of the learner

It should be noted that the choice of six morphemes as the mark of a long recast was essentially an arbitrary one, yet, given the results, it appears that a span of six morphemes was a reasonable guess as a broad measure. Further more controlled empirical research with a larger population is necessary to establish what truly constitutes "long" and "short" recasts for L2 learners.[8]

Length of recast clearly affects recall. Long recasts overload time limitations of phonological store and are difficult to retain in working memory in precisely the form given. However, shorter recasts, for example those of less than six morphemes in length, are able to be retained in working memory and thus made available for comparison and further processing.

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[8] An intriguing finding, although a digression, is that Low learners tended to receive a higher proportion of short recasts, while for the High group the reverse was true. One explanation for this difference is NS sensitivity to the level of the learner. NS facilitators may have provided longer recasts more frequently to the higher-level learners, because they were perceived to be more able to cope with it. Adjustments made by the NS to the perceived level of the learner are found in both FLA and SLA; mothers, for example, adjust the length of utterances according to the age of the child (Newport et al., 1977). In SLA, NS adjust their speech according to NNS' comprehensibility (Varonis & Gass, 1982) and their perception of the NNS' comprehension (Larsen-Freeman & Long, 1991; Long, 1983a; Warren-Leubecker & Bohannonn, 1982). Additionally, higher-level learners made fewer errors in shorter questions such as *"what is it?"* and so rarely received recasts of these forms.

7.4 The number of changes made to the trigger in the recast utterance

The fourth research hypothesis also relates to the constraints of working memory. Accuracy of recall was compared according to whether there were one, two or three or more changes to the trigger utterance in the recast.

> *H4*: Recall will be more accurate the fewer the changes made in the recast utterance.

Hypothesis 4 was supported. While all groups performed better with fewer changes to the trigger utterance, it was also found that the higher the level of the group, the greater the difference changes to recasts made to accuracy of recall. The High and Intermediate groups recalled recasts with only one change with 20% greater accuracy than recasts with three or more changes. For the Low group, recasts with one change were recalled with 10% greater accuracy. In Example 6 below, the High learner appeared uncertain of how to express her original question and her recall of the recast was even further from a target-like utterance than her original attempt. She noticed neither the change of verb *"does"* to *"is"*, nor the addition of the preposition *"in"* and appeared confused in the recall. Perhaps in this case there was too much to attend to.

Example 6 *High learner KorF*

NNS	why why does er his wife ah (.) hospital?
NS	why is his wife in hospital?
NNS	mm * * why does why does his hospital?

In Example 7, the NNS was a Low learner, and also appeared unsure of her question form. In this case the recast represented a total rephrasal of her attempt and she fared much better in recall than the High learner.

She appeared to recognise the question form, recalling it correctly except for the inclusion of the possessive pronoun.

Example 7 Low learner JapF

NNS she's father (.) what do do?

NS what does her father do?

NNS ah what does father do?

These examples illustrate one possible explanation for the difference between the groups. Low learners received more recasts of fragments and these were recalled with approximately 50% accuracy. Changes were multiple, but recasts represented a total rephrasal rather than changes which could be compared with the original utterance. Recall of such recasts required learners to abandon their original attempt and simply reiterate the target-like version. In contrast, High and Intermediate learners received recasts of multiple minor errors, which tended to concern elements within the question such as prepositions and articles, rather than the question form itself. Recall required multiple minor adjustments to the original utterance. Some were recalled and others were not, leading to a lower degree of accuracy of recall for recasts with multiple changes.

Previous research on the incidence of recasts in FLA and SLA suggests that recasts are less likely when there are more errors (Bohannon & Stanowicz, 1988; Doughty, 1993; Farrar, 1992; Oliver, 1995). The findings reported here suggest, further, that such recasts are less likely to be noticed by learners. This reiterates previous findings of classroom foreign language learning (Doughty, 1993; Richardson, 1993) and FLA (Bohannon & Stanowicz, 1988; Farrar, 1992). Recasts in which there was only one change to the original utterance were more salient to the learner than those with multiple changes.

In addition, the results concerning both length and complexity of the question form recast support the claims of researchers such as Gass (1991)

and Boulouffe (1986) who note that if the mismatch between the TL utterance and the learner's utterance is too great, it will not be perceptible to the learner or the two brought to comparison by the learner.

In summary, learners notice recasts which are closer to their original trigger utterance and which change that utterance in few ways. Having said this, it is also true that other factors such as length of recast and, as discussed below, type of change, interact with the number of changes in the recast.

7.5 Types of changes made in recast utterances

A fifth hypothesis investigated the effects of different types of recasts on accuracy of recall, that is the type of change made to the trigger utterance in the recast. As question forms were targeted in this study, the type of difference was described in terms of the type of changes made to questions.

> *H5*: Accuracy of recall will differ according to the type of change made in the recast utterance, such that syntactic changes will be recalled with greater accuracy than morphological changes.

Hypothesis 5 was not supported. The results indicate that learners noticed recasts to morphological errors more than recasts of syntactic errors. Why should this be the case? Perceptual salience of particular morphemes, such as the morpheme *"ing"* which is syllabic, may be a contributing factor. This is seen in Example 8.

Example 8	*Noticing of morpheme "*ing*"*	*KorM*
NNS	is he laugh?	
NS	is he laughing?	
NNS	laugh * * is he laughing?	

However, in the same way that salience alone does not predict order of acquisition of this morpheme (see Bardovi-Harlig, 1987; Long & Sato, 1983), the morpheme itself was not always noticed by the learner, as seen in the following example. Here the learner noticed the inversion of subject and auxiliary but not the change to the verb *"cry"*.

Example 9 *KorF*

NNS why (. .) she's cry?

NS why is she crying? * *

NNS why = why is she cry?

Additionally, the category of morphological errors included both salient and non-salient morphemes. While the syllabic morpheme *"ing"* may be clear to hear, the nonsyllabic past morpheme *"ed"* is not (Gass & Selinker, 1994; Sato, 1990). Rather than the grammatical function of a feature (e.g. morphological or syntactic), future research may explore the interaction between noticing and contibution of particular factors to the perceptual saliency[9] of features, such as syllabicity, word stress, position in a word or utterance (Hatch, 1983; Gass, 1997).

Another explanation is that morphological changes tend to be unitary, while syntactic changes are more complex, involving several changes, and are therefore harder to recall with accuracy. This is seen in the two recasts found in the following example:

Example 10 *KorF*

1. NNS but why she's crying?
2. NS why is she crying?
3. NNS yeah * * why she cried?
4. NS cos her favourite animal is not there
5. NNS why her favourite animal is not there?

[9] The definition of saliency is problematic here as it is intrinsically linked to noticing and indeed is defined as features in the input noticeable to learners or more available to be noticed (see Bardovi-Harlig, 1987; Gass, 1997; Sharwood Smith, 1991). I thank Alison Mackey for pointing this out to me.

6. NS why isn't her favourite animal there?

7. NNS [yeah] * * why isn't her favourite animal is not there?

In Example 10, subject and auxiliary are inverted in the recast (line 2). Apparently the learner noticed that the recast was different, as she modified her original utterance in the recall, yet her recall was quite different to the recast; the learner changed the morphology to the verb from *"crying"* to *"cried"* and deleted the auxiliary altogether (line 3). On the face of it, inverting the subject and auxiliary would seem a simpler operation to perform. Evidently the learner failed to notice the inversion, perhaps because it was outside of her IL grammar at this time. Similarly, in the next recast sequence, she modified the recast in recall, correctly recalling the first "chunk" (Miller, 1956) of the utterance, but then simply attaching it to her previous utterance (line 7). In this way *"why isn't"* could be interpreted as a question word chunk rather than inversion. These examples suggest, as discussed above, that learners may notice recasts in terms of their own interlanguage grammar. This is seen again in Examples 11 and 12, with a different learner. An example of this learner's IL production in the pre-test is given, followed by an example of her performance on a similar recast of a Q5 form in the first treatment session.

Example 11 *Pre- test CanF*

NNS what are you doing this this man

NS this man is setting the table

NNS mm what are you doing this woman?

In the pre-test, the NNS used the formula *"what are you doing?"* followed by the particular agent noun. In the treatment session, seen below in Example 12, she used this formula again (line 1) and was unable to recall the recast, except to recognise the order of the noun and verb in the question (line 3)[10]. Similarly, when the Q5 form was recast for her a

[10] It is interesting that the learner notices the order, given Slobin's (1973) assertion that a major operating principle in FLA is for the child to pay attention to the order of words and morphemes. Here it appears that the adult learner, faced with multiple changes,

second time, it was the order that she managed to recall (line 6). Interestingly, she changed the auxiliary from *"do"* to *"are"*, in accordance with the formula *"what are you doing? "*. Finally, given a Q5 form once again, she managed to reconstruct it almost correctly in recall (line 9).

Example 12 *Treatment 1* *CanF*

NNS Julie where where are you going Julie? where are you going Julie?

NS where is Julie going?

NNS [laughs] * *where you Julie going?

[later turn]

NNS Julie what do you do what do you doing Julie?

NS what is Julie doing?

NNS * * what are you Julies doing

[later turn]

NNS what where where is? where Julie where she she?

NS where is Julie going?

NNS oh where is going Julie going?

Destabilisation (Gass & Varonis, 1994; Mackey, 1995; Pienemann et al., 1988), in which the learners' production reflects great variability and confusion, owing to changes in their SL knowledge, may be the results of learner biases filtering what is noticed of the input. In this case the learner may notice her IL form is different to the recast, but her apperception of the recast is partial; she receives an incomplete picture of the input given.

Another reason for the differences between recall of morphological and recall of syntactic changes may be a developmental one. It may be that morphological features are not developmental and are subject to variational accuracy in the learner's performance. The learner may "know" the feature but not use it at a given time. In this case, the recast

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pays attention to order , specifically the position of the subject. It may be in this case that this was the focus of the learner's difficulty in production and therefore what she noticed of the recast.

serves as a reminder of the correct form. Syntactic features, in contrast, may be more demanding to recall if they are beyond the learner's level of knowledge. [11] In the absense of further work on variational and developmental features in ESL (see Pienemann & Johnston, 1987), however, this is difficult to assess.

In summary, one explanation for morphological changes in recasts being more readily recalled than syntactic changes lies in the number of changes required. In the above examples, it is seen that syntactic changes to the question form often involved different elements within the utterance. The learner above appeared to notice the order of the recast, before she was able to recognise the use of the auxiliary. Thus learners may notice one aspect of the recast but not others. Morphological changes, by contrast are more often unitary and thus more salient to the learner, who has to attend to only one new feature. Evidently the number of changes, as discussed above, interacts here with type of change. Another explanation may lie in the the degree to which morphological features may be already known to the learner.

The following two sections consider categories of morphological and syntactic changes which were found to be recalled with differential success by learners, suggesting, as noted above, that not all morphological changes are recalled with greater accuracy than all syntactic changes.

7.5.1 Effects of fronting on recall of syntactic changes

While the High group found syntactic changes fairly uniformly more difficult than morphological changes, this was not the case for the other two groups. The Intermediate group found recasts in which the change was at the beginning of the utterance most difficult to recall, achieving only 58% accuracy. The Low group, similarly, achieved only 48% accuracy in these type of errors. This result is puzzling given the research

[11] personal communication Patsy Lightbown (1999).

on FLA in which the beginning of the utterance is more salient to the child (Gleitman et al., 1984; Newport et al., 1977) and SLA work in which fronting is an early developmental processing feature in question forms (Pienemann, 1984; Pienemann & Johnston, 1987). In addition, research on working-memory performance demonstrates a primacy effect in which, in a list of words, the first ones are recalled more efficiently than those that follow (see Stevick, 1996). A closer analysis of the data revealed very low tokens of fronting in recasts; 22 of 33 learners received two or fewer recasts involving fronting. Thus, for any learner, 50% accuracy on recall of changes, which were fronted in the recast, reflected simply that one of two recasts was noticed. Obviously more data are required in order to develop an accurate picture of the learner's noticing of this type of change.

7.5.2 Effects of substitution on recall of morphological changes

Another category, in which groups were not homogenous in what they found particularly difficult or easy to recall, involved substitution changes. Like other groups, the Low learners scored very high indeed on changes to the morphology itself (85%), but unlike other groups, they were very poor on recall of morphological changes which involved substitution of the auxiliary (43%). Again, further inspection revealed that within this category, tokens were low. Only six Low learners received recasts involving auxiliary substitution. Nevertheless, five of these six learners found these types of recast more difficult than recasts of morphology, and three learners scored below 30% on the latter. These results may reflect the prior L2 knowledge of the learners; they may have recognised changes to morphology such as the addition of the morpheme *"ing"* or *"ed"*, but not differences in the use of the auxiliary *"do" or "be"*. Such anomalies point to the need for tapping prior L2 knowledge of the learner, for example through a grammaticality judgement pre-test (see for example, Doughty, 1991; Carroll & Swain, 1993) in order to explore further the effects of knowledge/experience on noticing.

7.5.3 Recall of other changes

Changes to the trigger utterance, which were external to the question form itself, were categorised as "unrelated", as recall of questions was the specific focus of this study. Learners found these changes easiest to recall. Such changes included lexical items. Following VanPatten (1996), lexical items should be more readily noticed by the learner as these are particularly important to the meaning of the utterance. Additionally, these items typically received stress in the recast. In Example 13, given below, the verb *"talking"* was recast as *"saying"* and was correctly recalled by the learner.

Example 13 *KorM*

NNS what ah what is what is what is she mother talking?

NS what is her mother saying?

NNS * * what is her mother saying?

In Example 14, the same learner received a new idiom in the recast *"in a hurry"*, which he repeated to himself even before being prompted to do so in the cued recall. Interestingly, he did not recall the whole recast with accuracy and even the new idiom suffered. What he did recall was what carried the meaning in the utterance.

Example 14 *KorM*

NNS why why h= ah shes hurry up why why is she is **he** hurry up ah?

NS why is he : in a hurry?

NNS ya in a hurry * * why he in hurry?

Mackey and Gass (1998), in a recent study using stimulated recalls on interactional modifications occurring in the context of task-based interaction, also found that learners noticed lexical, semantic and phonological errors more than morphological or syntactic errors. In the present study with its focus on question forms, morphosyntactic forms are those examined. However future research could fruitfully target noticing of recasts of semantic, lexical or phonological errors.

The finding that learners appear to notice and recall lexical items more readily than others, lends support to VanPatten's (1996) assertion that, in terms of attentional resources, priority is given by learners to meaning over form.

In Example 15, the learner ignored the question form given, but picked out the two words he heard repeated: lexical items which carried the core meaning.

Example 15 *ThaiM*

NNS he have a life? life?

NS life? something alive? is there something alive?* *

NNS something and alive

However, new or unfamiliar lexical items occurring in recasts can pose difficulties for the learner, as seen in Example 16. A bias for *communicative value* does not guarantee noticing. Here the NNS evidently did not know the word *"wave"*; she was unable to produce it initially, using gestures to indicate her meaning, and was unable to recall the new word when recast.

Example 16 *KorF*

NNS why hand hand {gestures}

NS why is the hand waving?= * * =

NNS =yeah= why

While lexical items are more likely to be noticed, the category "unrelated changes" also included unstressed non-salient features such as articles, plural *'s'* marking and prepositions. Although an analysis of noticing of particular grammatical forms was not carried out in the present study, this may be important for future research. VanPatten's (1996) theoretical work provided some explanation for the variation found in learners' recall of grammatical forms. One principle of input processing he gave was that: "for learners to process form that is not meaningful, they must

be able to process informational or communicative content at no (or little) cost to attention"(p. 15). In other words, the learner notices grammatical forms extraneous to the core meaning of an utterance, only if comprehension is effortless or at least somewhat automatic. In these data, it appears that for every example of a learner recalling with accuracy recasts of grammatical forms, there are others of inaccuracy. In the examples given below, the first learner noticed the change to the auxiliary but not to the article. The second learner receives a similar recast and noticed both the change to the auxiliary and to the article in the recast. Clearly, noticing of features such as articles which are unstressed and not crucial to comprehension may or may not be noticed by the learner at various times, perhaps depending on the attentional resources available to the learner.[12]

Example 17 *Inter learner* *CanF*

NNS and is the house : have : the gate?

NS does the house have a gate?

NNS does house have the gate?

Example 18 *Inter learner* *KorM*

NNS this pic= is is this picture show the dam?

NS does the picture show a dam?* *

NNS does the picture show a dam?

In summary, two arguments have been given to explain the relatively high accuracy of recall of lexical items in these data. Lexical items presented in recasts may be more easily recalled because (a) the form is perceptually more salient and (b) it is the meaning-bearing unit in the utterance. Other elements within the utterance may also be noticed, if attentional resources are available.

[12] These features would also fall into the category of variational features, identified by Pienemann and Johnston (1987), which they suggest are produced with varying degrees of accuracy by different learners according to the preference of the learner to accuracy or communicative efficiency.

7.5.4 Noticing recasts of fragments

Generally, recasts of fragments were given, either in response to a question form that was unusual in the context or, more commonly, in response to the learner's inability to express what he or she wanted to say.

One reason why recasts of fragments may be difficult for the learner to recall is that they represent little overlap with the original trigger utterance, particularly if the recast is long. This is seen in Example 19 below. Here the learner had difficulty both with the syntax and the lexis, confused over whether to say *"constract"* or *"contract"*. From the recast, he picked out both the change from *"what"* to *"why"* and the use of *"contract"*, but not the rest of the utterance. Oddly, the NS in this example omitted the article in imitation of his NNS interlocutor.

Example 19 *KorM*

NNS	illegal ah contract uh is is contract no mean contact contract ah mean con constract contract constract what is constract order? illegal
NS	why is contract illegal? =* *=
NNS	=ya ya ya= why is contract ord why is constract ah do?

Additionally, learners may have had more difficulty recalling forms which were less familiar to them, which they could not have produced unaided, as will be seen in further discussion below.

If noticing a form is related to how familiar the form is, that is to how automatic for comprehension and production it is to the learner, this may provide an explanation for why High learners recalled recasts of fragments with over 10% greater accuracy than the other two groups. Beginning learners, in particular, may have difficulty recalling fragments because there is more to notice. Less is automatic to them and therefore more attentional resources are required. Not only do they have to recall the words themselves, but also the very expression of them is an effort, unused as they are to the phonemes of the L2. This is seen in Example 20 below, in which the learner appeared to juggle sounds, pronouns and auxiliaries in her attempt to ask the question. When she received the

recast, she acknowledged it but was unable to recall it with any accuracy, perhaps reflecting the conflict between the recast and her own IL grammar.

Example 20 *Low learner KorF*

NNS oh what do we do she?

NS what is she doing? =* * =

NNS =yeah= what di what is what she wi doing?

On the other hand, recasts of fragments may pose little difficulty if the form recast is recognisable to the learner, as in Example 21.

Example 21 *Low learner KorF*

NNS shes mothere? ah who who is mothere?

NS is she her mother?=* *=

NNS =ah= is she her mother?

In this example, it is while the attention of the learner was fixed on the meaning of the utterance, that the recast was provided and the recast supplied precisely what the learner herself was trying to say. In other words, the recast was semantically contingent (Long, 1997; van Lier, 1988) and it was easily recalled by this learner.

It seems that it is only when the recast was relatively unfamiliar to the learner, or overly long, that the learner was unable to recall the recast of a fragment. Again, this can be understood in terms of limited attentional resources.

7.6 Inter-relationship between variables

Clearly, variables are inter-related and accurate recall of recasts is likely to be a factor of not one but many variables. While more data are required to provide significant correlations between particular variables, for example between length and number of changes in the recast, the

discussion thus far has suggested that variables are not independent. In order to estimate the differing contributions to the predictive value of each of the variables discussed here, futher research entailing a more controlled design with larger samples and precise definitions of variables would be necessary, and a multiple Repeated-measures analysis of variance carried out. The present study provides clear indications of some of the variables involved in noticing of recasts.

7.7 Further analysis : other variables affecting recall

7.7.1 Communicative intent of the learner

The work of Gleitman, Newport and Gleitman (1984) in FLA research on the role of expansions, a type of recast, is germane to this study. They write:

> expansions (...) provide the child with the relevant closed class[13] information at just the point when the child's attention is likely to be focused on the appropriate construction and the appropriate meaning. Moreover, expansions are also likely to present this information in a stressed form. (p.74)

This has been argued to be the case in this study: Recasts provide the learner with TL forms at the point when the learner's attention is focused on how to construct that particular meaning in the target language (see also Long, 1997; Mackey & Philp, 1998).

Although rare in these data, at times the recast provided may have been at odds with the way the learner was trying to express a particular idea. In the following example, in hindsight, perhaps the learner wanted to say *"is he saying not to walk? "*. The learner, unprepared for a recast which is a different albeit accurate way of describing the picture, recalls it

[13] Gleitman, Newport and Gleitman (Gleitman et al., 1984) identify closed class items as "the inflections and functors, those items that can occur unstressed in the languages of the world" (p.71) . They argue that closed class items alone are environmentally

incorrectly. Although the meaning of the recast is consistent, in terms of the form there may have been too great a gap between the learner's IL utterance and the recast for the learner to recall accurately the latter.

Example 22 *Low learner KorM*

NNS why no walk is he say? why? I mean this is he dangers no walk no walk?

NS oh is he saying it's dangerous?* *

NNS is say danger?

In Example 23 there is an obvious confusion between the two speakers. The NS incorrectly recasts the NNS' original question, thinking he is talking about the girl in the picture. The NNS does not recall the recast, but manages to modify his own question in a more TL way. In this case the mismatch was meaning-based. Evidently this recast served to push the learner to a more TL question form, rather than providing the learner with a model.

Example 23 *Inter learner KorM*

NNS what it is what it is what is it what is it near the other see near on the see near the near the see

NS the girl?

NNS ya

NS is she on a seat?

NNS yah * * mm on the one the see ah what what is it?

In both examples there was a mismatch between the recast and the communicative intent of the learner. In both cases learners failed to recall them (see Long, 1997; van Lier, 1988). In Example 22, the NS' utterance recast the learner's utterance in a manner perhaps unexpected by the learner. In Example 23, the recast was not semantically contingent with the learner's utterance. Interestingly, both episodes were negotiation sequences. Here recasts functioned as confirmation checks by the NNS and pushed the learners to reformulate their questions. Apparently, the

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influenced in FLA, while open class items are not. Such a distinction may also be

learners did not notice the form given them in the recasts, but they did take the cue to try again. These examples inspire further direct research into learners' noticing of form in the context of all types of meaning-based negotiation sequences. [14]

7.7.2 The use of recall as an instrument for measuring noticing

As explained in Chapters 2 and 3, noticing is described in this study as the learner's detection of elements in the input, entailing both the selective attention of the learner and an awareness of form at some level (Robinson, 1995b). Awareness is understood as being on a continuum, rather than a dichotomy. What is being measured in this study by the use of recall is a subset of what is noticed by the learner; that is noticing at the level of ability to recall accurately. Undoubtedly, learners may notice input yet be unable to recall it. For example, they may notice that something in the recast was different to their own utterance, yet be unable to perceive what it is that was different. Alternatively, they may notice the difference, yet be unable to reproduce it because of the limitations of working memory. Longer recasts, for example, are harder to recall than shorter, primarily because working memory is limited. Beginning learners, in particular, may be further hampered by a lack of prior L2 knowledge and automaticity in comprehension and production. Learners may notice L2 input, but be unable to repeat it. Thus, noticing by the learner may or may not manifest itself in accurate recall. If recasts are recalled, however, it is evident that noticing has taken place: Input has been detected and subsequently rehearsed in working memory and may be available for further processing.

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important to consider in SLA.

[14] Other factors relevant to the issue of noticing not included in this study include affective factors such as motivation, and other factors individual to each learner: learning strategies, language aptitude and the performance of phonological working memory. L1 may also modulate learners' apperception of the input. Although beyond the bounds of this study, these are evidently fruitful areas for future research on noticing (e.g., Gass, 1997; Plough, 1994; Robinson, 1996a; 1996b).

Another aspect to the study was the incorporation and integration of recasts. It is possible that the use of recall may have had a more positive effect on learners' production and IL development than the provision of recasts alone.

N. Ellis and Sinclair (1996), discussing the link between phonological working memory and long-term acquisition of vocabulary, cite several adult foreign language studies in which repetition of words facilitated learning of vocabulary items (N. Ellis & Beaton, 1993; Seibert, 1927; cited in N. Ellis & Sinclair, 1996; Papagno, Valentine, & Baddeley, 1991). However these studies concern acquisition of vocabulary items, not of morphosyntactic elements. In the present study, repetition of the recast through recall may have promoted registration of the input in long-term memory and the eventual acquisition of question forms, more so than simply receiving the recast. The effect of repetition versus non-repetition of recasts was not under investigation in this study.

In summary, not all noticing is measured through immediate recall. Rather, these data represent a subset of what was noticed by the learner. The data do, however, represent intake in working memory, intake subsequently rehearsed and refreshed. Learners' recall of the recast reinforces any noticing that did occur. Note that learners were not primed prior to the recast being given but after the recast. In this way, only what was already detected and rehearsed in working memory was available for immediate recall. It is acknowledged that the task conditions, alerting learners to their interlocutors' speech through the use of the recall signal, probably made learners more alert to the details of that speech than they may have ordinarily have been.

7.8 Summary of learners' recall of recasts

The above sections have discussed the results concerning learners' recall of recasts. It was found that:

a) Learners do notice recasts in the context of task-based interaction;
b) Noticing is subject to various constraints;
c) Not all features in the recast are always perceived.

It was argued that these constraints included three conditions:

a) the limitations of working memory;
b) the degree of familiarity of the input for the learner;
c) the processing biases of the learner.

Processing biases include on the one hand developmental biases, so that a learner may not notice forms he or she is not ready to acquire and, on the other hand, a more general bias to give priority to meaning over form when attention is limited.

Incorporation and integration of recasts

The final section concerns the immediate and long-term outcomes of noticing, that is, learners' *incorporation* and *integration* of recasts. Where learners included forms that were recast and recalled in treatment sessions in subsequent production within the session, this was termed *incorporation.* Where learners produced forms provided to them in recasts in later post-test sessions, this was termed *integration* and provided evidence of the learners' use of the form from one to four weeks following initial use. The section begins with a brief summary of the findings of the qualitative analysis discussed in detail in the previous chapter. This is followed by further discussion and examples of incorporation and integration.

7.9 Learners' use of recasts: incorporation and integration of recasts

Does noticing transfer to IL grammar? Do constant reminders in the form of recasts make learners more accurate over time? These data suggest that where the data match the processing biases of the learner (N. Ellis, 1997;

Newport et al., 1977), and where there are repeated opportunities to hear IL forms and, subsequently, to produce them, learners do incorporate recasts of their non-TL production.

In a qualitative analysis of the IL production of three learners in the context of task-based interaction, recasts were found to have variable effects. Higher-level learners showed an increasing accuracy in treatment sessions, which suggests that recasts may have served to consolidate L2 data present in long-term memory (N. Ellis, 1997). In addition, increased production of question forms, constantly elicited in the task, may have led to an increased control and eventual automaticity for these learners (Ellis, 1994b; Nobuyoshi & Ellis, 1993). Variation was a feature of the interlanguage of all the learners; all produced both target-like and non-target-like forms of those questions they had acquired, and reflected inconsistent application of recasts in their production.

It is important to note that not all recasts led to incorporation. Noticing of recasts, as measured by accurate recall, did not always translate to immediate incorporation in the production of the learner. This finding concurs with models of SLA processes such as that proposed by Gass (1988; 1997): Input may be noticed and understood yet not processed further. In other words, noticing may or may not lead to intake (see also Ellis, 1994b; Pica, 1992b; Robinson, 1995b). This leads to the observation that not all noticing leads to learning. That is, noticing is necessary for learning to occur (Gass, 1991; Schmidt, 1990), but it is not sufficient (Robinson, 1995b).

7.9.1 Incorporation

In the data there were examples of both the immediate effect of noticing recasts and of no effect at all.[15]

[15] In this study incorporation was identified as use of a recast form not in the turn immediately following the recast, but in later turns, so as to distinguish it from simple repetition. Lyster and Ranta (1997) use the term incorporation to refer to a learner's

In Example 24, the learner was provided with a new idiom and initially repeated the recast *"it looks like bread"* but later returned to his original non-TL form *"looks bread."*

Example 24 No immediate effect Inter learner KorM

NS	yeah a great big piece of meat
NNS	(...) I I I th= I looks ah it it looks bread?
NS	it looks like bread [laughs]
NNS	yeah looks like bread
NS	yeah it does but it's actually meat it's a bi:g piece of meat maybe lamb
NNS	lamb?
NS	mm you know from a sheep?
NNS	yeah I see but in in my eyes it looks bread

Similarly, in Example 25, there was no immediate effect although the recast was correctly recalled (line 4). This learner used an IL question form which was very common in her production *"are there have a X?"*. In this case, even a second recast of the same form did not lead to an immediate effect.

Example 25 No immediate effect Inter learner KorM

NNS	are there have a are there have a sun?
NS	is there a sun?
NNS	is there a sun? * * is there a sun?
NNS	are there= um are there have house?
NS	is there a house?

A difficulty in identifying incorporation and integration in the data lies in the problem of eliciting contexts for production of those forms previously recast. Although all tasks elicited question forms and although the pre-test and Post-test 3 were matched tasks so that there was

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inclusion of a repair in a longer utterance directly following that repair. Gass and Varonis (1989) appear to include both in their description.

a fair degree of repetition, these were not matched with contexts occuring in the treatment tasks themselves. It is difficult to conceive of a way in which incorporation could ever be satisfactorily tested. As Gass (1997) notes:

> Short of taping all input that learners receive, every negotiation in which they engage, and every bit of subsequent output, there is little way of knowing just what the source of change is." (p. 126)

There were, however, numerous instances in which immediate incorporation of recasts was evident, as seen in Example 26 below.

Example 26 Immediate effect Intermediate learner KorM

1. NNS what kind what kind of animal does it live?
2. NS what kind of animals live here? =* *=
3. NNS =live here= what kind the what kind what kind the animal (.) live here?

Initially, the NNS was provided with a recast of the question in which the plural of the noun *"animal"* was added, the auxiliary and subject *"does it"* deleted and a preposition given (line 2). This was a long recast with many changes and the NNS had difficulty recalling it. However, he did notice the change to the syntax if not to the morphology (line 3). A few turns later, the NNS produced his IL form again, showing no incorporation of the recast (line 4). The form was recast again by the NS, this time it was shorter; only five morphemes in length, and changes were fewer since *"sheep"* required no plural morpheme. This time the learner recalled it accurately (line 6). He repeated the change to himself, even before being given the cue to recall.

[later turn]

4. NNS so how many animal how many sheep sheep ah does he live?
5. NS how many sheep live here?
6. NNS live here * * how many sheep live here?

This time in a later turn the learner incorporated the recast and produced the TL question form, although omitting the plural marking on *"cow"*, a marking he did not notice earlier (line 7). He heard the marking in the recast and correctly recalled it.

[later turn]

7. NNS how many how many how many cow live here?
8. NS how many cows live here?
9. NNS how many cows live here?

The chunk *"live here"* which he had noticed in earlier recasts was applied in a non-TL way in a subsequent question (line 10). The NS supplied him with the TL version in the recast.

[later turn]

10. NNS where is where is he live here?
11. NS the= where are the cows?

What is of interest is that in the two subsequent questions posed by the NNS (lines 12 and 13), he managed to differentiate between the two forms, accurately using the new question form *"how many [noun-plural] live here"* and the standard Q4 form *"where is X?"*. This is evidence that the learner's use of the new form was not just a clustering effect (Mackey, 1995; in press) in which the same question form is reiterated in quick succession. Indeed, this learner finally demonstrated true incorporation of the new form by producing it with a new verb *"stay"* (line 14).

[later turn]

12. NNS ah how many horses live here?

[later turn]

13. NNS where is where is horse?

[later turn]

14. NNS how many people how many people stay here?

In these data a sequence of repeated recasts of the same question form, together with opportunities to produce the form once noticed, led to

incorporation of the form in the learners IL. The next section discusses subsequent integration of recasts in post-test sessions.

7.9.2 Integration of recasts

Quantitative analyses of the learners' production of question forms in post-tests following treatment reveal changes in both the amount of questions learners produced and the proportion of each type of question form used. All groups were found to increase their production of question forms from pre-test to Post-test 3. Although not the sole cause, in part this may be a factor of task familiarity. While this study did not control for effect of task familiarity, a comparable study by Mackey (1995), using many of the same tasks, did. Mackey (1995) found increased production of questions by learners who received interactional modifications through negotiation[16]. These groups produced significantly more question forms in post-tests compared to pre-test performance. However, one of the treatment groups received scripted input rather than modified interaction. This group and the control group, who had fewer task sessions, showed no significant increase in their use of question forms in post-tests. Thus, in Mackey's study, no effect for task-familiarity was found.

In the data investigated, as learners continued to produce question forms and receive recasts which they then repeated, they may have gained greater control over their production of questions, refining their use of certain forms and expanding their repetoire.

7.9.3 Outcomes of production of question forms

There appear to be at least four ways in which opportunities to produce questions were important to the learners in this study. First, as suggested above and as has been argued elsewhere, opportunities for output

[16] These results were also those found by Mackey and Philp (1998) in a study in which the treatment group received recasts of their non-target-like production of question forms

provide practice for learners. This may lead to increased control over L2 forms and automaticity in IL production due to the repetition, consistency and predictability that such practice gives (Givón, 1989; cited in Weinart, 1995; Ellis, 1994b; Gass, 1997; Nobuyoshi & Ellis, 1993; Swain, 1985).

Secondly, where practice leads to routinisation in production, this arguably decreases processing load, allowing the learner to attend to recasts and to process more complex and a greater quantity of material (Gass & Selinker, 1994; Givón, 1989; McLaughlin, 1990; Weinart, 1995).

Thirdly, when learners are "pushed" in their interlanguage production, in this case to ask questions to complete a task, they may struggle with expressing meaning. This struggle to be understood encourages a syntacticisation in the learner's language and a testing of tacit IL hypotheses about the TL (Gass, 1997; Swain, 1985; 1995). In this case, as learners struggle with asking questons to complete a task, their internal hypotheses about how to ask those questions are tested, as seen in the two examples given below. In Example 27, an Intermediate learner eventually worked out how to ask the question in the negative. In Example 28, another learner had difficulty when she tried to include "has" as an operator, her final question was non-TL.

Example 27 *Pushed output* *ThaiF*

NNS why is there isn't there nothing sign why is there nothing sign why is why isn't there sign?

Example 28 *Pushed output* *KorF*

NS no I have a car= a rabbit but he has something else in his hands

NNS yeah oh mm whats what ah whats has whats has the rabbit whats the rabbit whats the whats the rabbit ah what have what have what has what has rabbit what has the rabbit hold?

Importantly, it is in the context of their production that learners receive recasts of their attempts and may compare the two, as seen below.

Example 29 *Pushed output followed by a recast* *CanF*

NNS what is ah what what is she say what is ah she say ah her her baby?

NS what is she saying to her baby?

Fourthly, as seen in Example 29, output provides the learner with opportunities to receive feedback from the interlocuter (Gass, 1997; Swain, 1995). The strength of interactional feedback is that it is contiguous with the learner's current production and, crucially, his or her focus (Long, 1997; van Lier, 1988). In the case of recasts, at the very time that the learner's attention is focused on how to express a given meaning, the learner is provided with a TL version of his or her attempt. Such contiguity surely increases the odds that feedback will be relevant to the learner both in terms of content and difficulty level.

In conclusion, constant use of questions, coupled with feedback, may have contributed to the learner's IL development through an increased systematicity and control over L2 forms, a reservoir of TL samples and an internalisation of knowledge based on L2 input. On the basis of a qualitative analysis of data presented in this study (see also Mackey, in press; Mackey & Philp, 1998) output followed by feedback appears to have had various effects on learner's production of question forms. First, as discussed above, output followed by feedback led to an increase in learner's overall production of question forms.

Secondly, to a limited extent, there were changes in the proportion of questions used by learners. Significant changes between pre- and post-tests, only occurred for Q5 forms and, for each group, solely in one post-test. For the High and Intermediate group, this was in Post-test 1, for the Low group, this was in Post-test 3. The High and Intermediate groups' proportionally greater use of Q5 forms over other forms in Post-test 1 suggests an immediate effect of treatment sessions, reflecting increased

control over this form as discussed above. However this effect was not sustained over time. The Low group produced fewer Q5 forms, in proportion to other forms in Post-test 3. Learners in this group did not develop beyond Stage 4. In their case, the production of Q5 forms reflected the use of formulae such as *"what is he doing?"*. The decreased use of Q5 forms in Post-test 3 suggests less reliance on these formulaic utterances and more use of IL forms. This is seen in the examples given in the section below.

Finally, the provision of recasts and the noticing of those recasts appears to have led to a destabilisation and, in some ways, a lack of control over L2 forms, as the learners progressed from the use of formulaic questions to interlanguage forms. Yet this destabilisation in itself suggests a change in IL grammar, the internalisation of L2 input. Gass and Varonis (1994) exemplify destabilisation as the triggering of change in the learner's exisiting SL knowledge. They hold that "destabilization, then, is crucial if learning is to progress to higher levels" (p. 299). This is discussed, with examples, in further detail in the following section.

7.9.4 Evidence of development of question forms within stages

How learners' interlanguage changed in terms of ESL question development as a result of the treatment was difficult to assess. [17] Learners' repeated use of utterances such as *"what is he doing?"* or *"what does she do?"* created difficulties in distinguishing whether an utterance was formulaic or whether it was truly a part of the learner's own IL

[17] Mackey (1995; in press) and Lightbown and Spada (in press) addressed this issue through an analysis of stage increase. This involved a comparison between learners' stage of question development prior to and following treatment. Learners' stage of development was assessed based on their production of non-formulaic question forms within the six-stage sequence described by Pienemann and Johnston (1987) and Pienemann, Johnston and Brindley (1988). While such an analysis reflects learners' actual development in terms of stages, it was problematic with the data in this study for two reasons. First, the majority of learners were already at Stages 4 or 5 in the pre-test and therefore could make little progress in terms of stage development. Mackey (1995) found movement across stages for learners initially at Stages 2 or 3, but not for those who were at Stage 5 . She attributed this to a lack of Stage 6 questions in the input. Secondly, a reliance on formulaic

system (see Wong-Fillmore, 1976; Bohn, 1986 for discussion of this controversy). A series of questions from Post-test 1 by a Low learner in Example 30 below illustrates this. "Formulas" or "prefabricated patterns" are identified as unanalysed units not yet assimilated into the internal structure of the IL, but which are productive for the learner. Both formulas as fixed strings such as "*I don't know*" and as sequences with optional slots such as "*how many X do you have* ?" are included here and have been identified in previous research (for review, see Weinart, 1995). For the Low learners in this study, formulas provided them with a means of participating in the task with the NS and thus gain L2 input (Ellis, 1984; Hakuta, 1976; Weinert, 1995). These learners often received recasts of formulaic utterances, as seen below, and this feedback may have helped to refine their use of them.

Example 30 *Recasts of a forumlaic utterance* *KorF*

NNS what are you doing here what are you doing there?

NS what is she doing here?

For higher-level learners the use of sequences that were routinised and somewhat automatic allowed attentional resources to be allocated to other aspects of their production (Ellis, 1994a; Weinart, 1995). In the following examples, this particular learner clearly worked on the formula *"what is [pronoun] +[verb]-ing?" '*, substituting pronoun and verb. There were no other Q5 forms used by this learner in this session, with the exception of *"where is he going?"*, which essentially followed the same pattern and was itself probably a memorised chunk.

Example 31 *Q5 forms produced inPost-test 1* *JapM*

1. NNS what : is he doing? (5 tokens)
2. NNS what : is he looking?
3. NNS what : is he mm is she doing?
4. NNS what : is he thinking? (4 tokens)

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utterances by learners made it difficult in the present study to assess reliably learners as being at a particular stage. For these reasons this analysis was not used here.

5. NNS what : is she doing?
6. NNS what : is she thinking?
7. NNS what what : is he waiting?
8. NNS where is he going?

This learner was able to produce a variety of Q4 forms, as seen below.

Example 32: Q4 forms forms produced inPost-test 1 JapM

1. NNS is this alien?
2. NNS where is this?
3. NNS what is this?
4. NNS what's this?
5. NNS where is there?
6. NNS who is she?

This learner could be seen to advance from Stage 4 in the pre-test to Stage 5 by Post-test 3. What is more illuminating, however, is to see his gradual development from the use of formulas and substitution to novel interlanguage forms, as seen in the examples given below.

In Post-test 1, as seen in Example 31 above, the Low learner used Q5 forms exclusively with the singular third person pronoun. In Post-test 2, this learner demonstrated the ability to use the form "[question word] + [aux "*be*"] + [agent] + [verb]-*ing*" with both nouns and pronouns.

Example 33 Q5 forms forms produced inPost-test 2 JapM

1. NNS what is : what (.) what is the (...) what is the yellow clothes man doing?
2. NNS what what are they doing : on the car?

By Post-test 3, a much greater variety of Q5 forms was evident, some of them non-target-like. For the first time, too, this learner used Q5 forms

with alternative auxiliary verbs to *"be"*, as for example in *"why do they took the meat?"*.

Example 34 *Q5 forms forms produced inPost-test 3* *JapM*

1. NNS how many books : do you have?
2. NNS what does it have?
3. NNS what does she wear?
4. NNS (...)why are= (.) why do they took the meat?
5. NNS what : is she doing?
6. NNS what : kind of food (.) is she cooking?
7. NNS what time does she cook uh is she cooking?
8. NNS where will (.) they go?

Some researchers argue that formulas may contribute to the development of a creative rule system as learners generate novel utterances incorporating the formula (Wong-Fillmore, 1976; Weinart, 1995; Ellis, 1984). There is some evidence, at least in child SLA, that learners can derive rules from formulas and use them productively (Huang & Hatch, 1978; Wong-Fillmore, 1976; Weinart, 1995; Vihman, 1982). As seen in the examples presented here, there is some indication in these data that formulas are used as stepping-stones for learners, both as a means of participation in interaction and of incorporation of TL input in the IL. While a detailed analysis of the relationship between the use of formulas and interlanguage development, requiring comprehensive longitudinal data (Bohn, 1986), is beyond the bounds of this study, this may be a fruitful avenue for future qualitative research.

As discussed in the case studies of three learners in the previous chapter, a common finding was that learners had difficulty with the use of *"do"* as an operator rather than the auxiliary *"be"*. Often *"do"* was used in the same way as *"be"*, with the participle on the verb (e.g., *"what does she preparing?"*).

Examples are given below for an Intermediate learner, reflecting an increased accuracy in use of Q5 forms over time. In the pre-test, this learner used few Q5 forms. They typically occurred as formulaic chunks;

1. are other family what are you doing? ah what what what it is what it is what what what ya (.) ya other other family

or reflected difficulty with the position of the subject:

2. NNS this wife ah what are doing? what what what is she doing?

3. NNS how many how many mm did she invited invited invited people?

In Post-test 1, this learner used the auxiliary *"do"* in the same way as *"be"*, seemingly in free variation.

Example 36 Q5 forms produced in Post-test 1 KorM

1. NNS what what do they what what do this what do this ah man doing?
2. NNS what what do what does he ah what does he doing doing the 3 days in Queensland?
3. NNS ah what what what is he thinking ah about this guy?
4. NNS ya ya i= i= why is she= why do= does she ah sit here? sitting at= sitting here?
5. NNS ah what are they what what these what are these doing= they doing?
6. NNS what are they ah talking about?

The treatment sessions appeared to have had a destabilising effect (see Mackey, 1995 for similar effects in Post-test 1) on his interlanguage grammar. In Post-test 2, one week later, some variation was seen in the presence or absence of the participle of the verb, although this was found both with *"do"* and *"be"* as operator.

Example 37 *Q5 forms produced in Post-test 2* *KorM*

1. NNS why is ah ah he look ah to there to they?
2. NNS ah why ah broken (.) this window ah why why ah is stranger broken this window?
3. NNS why (.) ah why does she it= dig on the ground?
4. NNS that person ya what is ah what is (.) the person doing?

Two weeks later, in the final post-test, such interlanguage variation continued. This learner used both target-like and non-target-like versions of Q5 forms; using both *"b e"* and *"d o"* as operators. Further, the gerund was not consistently used with either operator: compare for example lines 1 and 4 or lines 2 and 5 in Example 38. This is in contrast to the pre-test, in which this form appeared only with the participle of the verb, and rarely with *"d o"* as an operator.

Example 38 *Q5 forms produced by Inter learner in Post-test 3* *KorM*

1. NNS how many how many times [does] she cooking for (.) day for day?
2. NNS so this is ah waiter so why (.) why is she why is he do that (.) his daughter ah I don't I don't understand
3. NNS toilet? ya very different and in my picture there nothing nothing boy ah is boy ah nothing is boy and ah one children ah the other children what what is she doing?
4. NNS what is what do bring bunny? what what do bunny bring?
5. NNS why ah why why why is is she ah cooking?
6. NNS why why why is she gave hers daughter ah food?

As such changes are not considered in the model as developmental, they are not reflected in the changes between stages. However such destabilisation does appear to be a result of interactional modifications (Mackey, 1995; in press) and to be a part of learners' gradual acquisition of question forms. Earlier discussion in this chapter suggested that learners do notice recasts of their non-TL utterances in the context of task-based interaction. This section offers some evidence that noticing may lead to eventual integration within the IL of the learner.

7.9.5 Limitations of the analysis

It should be emphasised that the examples given above are indicative rather than clear evidence of changes to learners' IL. In some cases absence of a particular form in one test may simply have reflected a lack of opportunity rather than an inability to use that structure. Furthermore, the data set here is limited, first, in that data from a control population were not considered and, secondly in that the number of subjects in the study, although not small by the standards of SLA research, was not large (N=32).

7.9.6 Summary of learners' use of recasts

It appears here that learners as a result of treatment sessions in which they were (a) constantly asking questions to carry out a task, and (b) being provided with recasts of those questions, built up both their ability to produce questions and, for those recasts they noticed, may have increased their internal "reservoir" or "database" of L2 input on these structures.

The fact that incorporation and integration were not always found as an outcome of noticing does not mean that there was no effect or that intake did not occur, but simply that the opportunity to test any effect may not always have been there. By the same token, incorporation of recasts does not necessarily imply sustained IL change, evidence for this would require longitudinal data (Lightbown, 1992; Pica, 1992b; White, 1991; White et al., 1991).

7.10 Summary and conclusion

The principal foci of this chapter have been:

a) learners' noticing of recasts;

b) constraints on noticing of L2 feedback in the context of task-based interaction;

c) some possible explanations for these constraints;

d) the subsequent use of recasts by learners.

The results demonstrate that learners do notice recasts, but they do not do so unfailingly and not in every detail. This has to do in part with the limitations of attentional resources. Unfamiliar input, multiple corrections, complex changes and long utterances all pose high demands on learners' attentional resources. Further, it is argued that the learner's own processing biases limit noticing: biases both to comprehend the message over analysing form and to perceive form in terms of the IL grammar.

While these limitations exist, the fact that High and Intermediate learners accurately recalled at least 70% of all recasts of question forms suggests that such feedback may be effectively used by the learner. Recasts are provided to the learner at just the time when the learner is focused on what he or she wants to say. The learner is supplied with corrective feedback on her attempt and, provided she recognises it as such, may benefit from the juxtaposition of IL form and TL version (Gass & Varonis, 1994; Lightbown, 1992; Long, 1997).

Arguably, it is precisely because recasts are provided once the learner has expressed his or her idea that attention is freed up to focus on form. As the meaning of the utterance is clear to the learner, it is the form of the utterance that is attended to (Long, 1997). Also, the fact that this occurs in the process of meaningful and spontaneous conversation, with the

Conclusion

Chapter 8

8.0 Outline

This chapter summarises the major findings of the study and relates these findings to a theoretical understanding of the links between noticing, interaction and second language acquisition. The results of this study raise implications for second language acquisition research, both theoretically, in terms of work concerning the interactionist hypothesis and practically, in terms of future research and the operationalisation of noticing in the context of oral interaction. Related to the theoretical implications are applications to language pedagogy, such as the utility of task-based interaction in the classroom.

This study began by identifying the need within second language acquisition research firstly to operationalise noticing in the context of conversational interaction and secondly, to provide evidence of learner's noticing of implicit feedback on their non-target-like production provided within this context. These were the central goals of this research. The findings are discussed in terms of the three central foci identified in Chapter 2:

a) The measurement of *noticing* in the context of native speaker/non-native speaker oral interaction;

b) The noticing of recasts by learners and constraints on noticing;

c) The link between learners' noticing and use of recasts in subsequent interlanguage production.

The chapter concludes by considering limitations on the findings and suggests avenues for future research.

8.1 Operationalisation of noticing

Cued immediate recall was successfully used as a measure of learners' noticing of recasts in the context of oral interaction. Although recall provided a limited measure of noticing, in that it reflected just one level of awareness, it nevertheless was a useful means of accessing noticing in oral interaction at the time that feedback was provided to learners. While a more refined and accurate measurement of noticing might be achieved through the use of physiological tests such as those used in the field of cognitive psychology, results would nevertheless be limited in other respects. The use of recall provided information not only about noticing, but also about what in particular was noticed by learners and how this related to their own representations of the data.

Albeit restricted, the use of recall to measure learners' noticing of implicit feedback, provided in the context of oral interaction, was a particularly important innovation of this study. While noticing is hypothesised to play a crucial role in the impact of negotiated interaction on interlanguage development, empirical work testing this position is lacking. Whether or not learners actually notice gaps between the input and their own representations of the L2 is an unknown at this point. The major contribution of the present research is that it does provide some empirical evidence of noticing and, arguably, for the link between interaction, noticing and acquisition.

8.2 The noticing of recasts by learners and constraints on noticing

The results of this study suggest that learners do notice recasts of their non-target-like utterances in the context of meaning-based interaction, given certain conditions; that is, provided attentional resources are sufficient and provided the input match the processing biases of the learner.

Constraints imposed by attentional resources (e.g., the selective, finite and transitory nature of working memory) are argued to account for learners' limited accuracy in recall of recasts, which involved multiple changes to the target utterance and/or which were longer than five morphemes.

Constraints of processing biases of the learner are argued to account for the effects of two other variables: the level of the learner (i.e., High, Intermediate and Low) and the type of question form (Q3, Q4 and Q5) on learners' accuracy of recall of recasts.

High and Intermediate learners noticed recasts of question forms more than Low learners. That is, the level of the learner was a predictor of how accurately recasts were recalled. Additionally, Q4 question forms, in which the subject and verb were inverted, such *"what is it?"* and *"is there a man?"*, were more frequently recalled with accuracy than Q5 forms such as *"what is the man doing?"*.[1]

Low learners may not have recognised structures in recasts that were beyond their level of development in question forms and which did not fit into their interlanguage system. In many cases, questions requiring inversion appeared to be apperceived by learners in terms of their own IL grammar, that is, without inversion. In other cases, while detected, novel recasts may have posed difficulty for Low learners who had no comparable data in long-term memory. Additionally, these learners were argued to have less attentional resources available to focus on form in recasts as automaticity in production and in comprehension was underdeveloped. High and Intermediate learners, by comparison, benefiting from the automaticity that comes with practice, were able to process changes to grammatical features in the input in addition to meaning.

[1] Paucity of data prevented statistical description of recall of Q3 forms.

Thus, the learner's apperception of the input may be modulated by his or her interlanguage grammar, by prior second language (L2) experience and by L2 representations in long-term memory (Gass, 1997). This apperception may also be affected by the learner's developing L2 processing capacity (Pienemann & Johnston, 1987), and by a tendency to a preference to attend to meaning over form (VanPatten, 1996). The final intake for the learner is determined by the combined weight of all these potential influences.

8.3 The use of recasts by learners in subsequent production

While noticing is necessary for acquisition of language, it is not sufficient (Gass, 1997; Robinson, 1995). Other factors may inhibit the process. For the High and Intermediate groups, although at least 70% of recasts were recalled with accuracy, it was not consistently the case that the learners then used the target-like form in subsequent production. This occurred most often when recasts of the same form were repeated within a session.

The results indicate that where the data match the processing biases of the learner (N. Ellis, 1997; Newport et al., 1977), and where there are repeated opportunities to hear target-like (TL) forms and, subsequently, to produce them, learners notice and later may incorporate recasts of their non-TL production.

8.4 Summary of findings

The results of the study are summarised below:

a) Level of the learner

> High and Intermediate learners noticed recasts of question forms more frequently than Low learners. That is, the level of the learner was a predictor of how accurately learners recalled recasts.

b) Level of the question form

> Q4 question forms, in which the subject and verb were inverted, were more frequently recalled with accuracy than Q5 forms.

These two findings are attributed to three factors: processing constraints, familiarity with the input and attentional resources.

c) Length of the recast utterance

> Short recasts (i.e., of less than six morphemes in length) were recalled with greater accuracy than long recasts.

d) The number of changes

> Recasts with three or more changes were recalled with less accuracy than recasts with one or two changes to the trigger utterance.

These two findings suggest that the constraints of short-term memory limit learners' noticing of complex or long recasts.

e) The type of change made in the recast

> Morphological changes were recalled with greater accuracy than syntactic changes.

This suggests that, in recasts of question forms, morphological changes are noticed more by learners than syntactic changes. A more detailed analysis of types of morphological and syntactic changes, however, revealed that further analysis according to saliency rather than grammatical category may provide further insights here.

8.5 Theoretical implications

The central research question addressed in this study is fundamental to the Interaction Hypothesis, as restated by Long (1997):

> negotiation work that triggers *interactional adjustments* by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways (pp. 451-452).

The results of this investigation provide support for some of the claims that have been made regarding interaction and acquisition. In particular the findings support the claim that interactional modifications, arising from problems in production or comprehension, help to focus learners' attention on language form and, in particular, to gaps between what learners know and produce and what they perceive in the target-language input (Ellis, 1991; Faerch & Kasper, 1986; Gass, 1991; 1997; Gass & Varonis, 1994; Long, 1997).

The claim is an important one for two reasons. First, it has been argued that noticing is requisite to acquisition (Gass, 1991; 1997; Schmidt, 1990). That is, learners must first pay attention to, or notice forms in the input, at the level of detection and registration in short-term memory, before that input is potentially of use, and processed further. Secondly, it is claimed that what learners need to notice in particular are the mismatches between the target-language input and their own interlanguage representations. It is the perception and resolution of this conflict that may lead to destabilisation and interlanguage restructuring (Ellis, 1991; Gass, 1991; 1994; Long, 1997).

While in general the findings support these theoretical claims, it is also important to note that not all recasts were noticed by learners and not all changes presented in recasts were noticed by learners. Secondly, noticing did not always lead to change, that is noticing is not sufficient for learning to take place. While there were examples in the data in which incorporation and eventual integration in learners' interlanguage production resulted from noticing of recasts, there were other examples in which no (immediate) change was seen. On the one hand, this points towards the need for longitudinal data. It may simply be that the effects were not immediately apparent, rather recasts provided learners with a database for future reference (Brock, Crookes, Day & Long, 1986; Gass & Varonis, 1989; Lightbown, 1994; Mackey & Philp, 1998; Pica, 1992). On the other hand, researchers such as Pica

(1997) have cautioned that not all negotiation leads to interlanguage modification, nor do learners necessarily take up implicit feedback.

8.6 Pedagogical implications

The results of the study also have pedagogic significance. In the context of concerns over the grammatical competence of second language learners who study in communication-oriented or form-focused classrooms (see Williams, 1995), these data provide important evidence that learners notice and benefit from implicit corrective feedback, specifically from feedback on morphosyntactic elements in their non-target-like production. An important factor in learners' noticing and use of recasts appeared to relate to the use of tasks, in which targeted forms were consistently elicited, and which gave learners repeated opportunities of practice and feedback on the same form.

Intensive recasts of forms, while leading to increased accuracy and incorporation in the data of this and other studies (Mackey & Philp, 1998) are an artefact of the treatment sessions in this study, and not typical of spontaneous conversation. Further, Lyster (1998a; 1998b) suggests that the saliency of recasts provided in laboratory studies with adults differ from those provided in content-based classrooms with young learners, where the high proportion of both recasts and non-corrective repetition may lead to ambiguity of such implicit feedback for learners. Nevertheless, intensive recasts may occur in the context of task-based interaction in a classroom setting where a particular form is repeatedly elicited by a task. This may point towards the potential of these form-focused tasks in the classroom (Gass, 1997) as well as those which are more "natural" (Long, 1991; 1997; Long & Robinson, in press). Tasks, which elicit the full participation of the learner and provide opportunities to negotiate meaning, may provide the context for learners to notice feedback provided to them (see Long, 1997). This study supports this claim, providing evidence that learners do notice recasts provided in the context of task-based interaction and may benefit

from such recasts, at least in the short-term. Noticing of recasts in classroom-based research is required to explore this futher.

8.7 Limitations of this study and suggestions for future research

8.7.1 The generalisation of findings

It is emphasized that this has essentially been an exploratory study and, of necessity, small. The learners involved were all educated, the majority were socio-economically advantaged and, in general, motivated to study the L2. Different populations involving larger samples from both foreign and second language settings and with less educated learners would allow for factors such as L1 and instructional context to be controlled. This is important in order to generalise the indications of these findings.

It should be noted that the research design involved native speaker /non-native- speaker (NS-NNS) pairs. Given that NNS-NNS groups are more common in the language classroom, a replication of the study with NNS-NNS dyads or groups would be of interest, particularly in the light of earlier work by Gass and Varonis (1989) on the incorporation of NNS corrections.

8.7.2 Short-term effects

While the research did investigate the short-term effects of noticing of recasts over four weeks following treatment, longer-term effects were not able to be assessed. While Mackey & Philp (1998) found both delayed and sustained effects of intensive recasts after 4 weeks, Leow (1998b) found that short-term effects for learners who detected targeted morphological forms were not sustained after five weeks. To some extent these differing results may be attributed to differing amounts of external exposure. Clearly, longitudinal data is needed to assess long-

term gains, notwithstanding the difficulties of controlling for outside exposure (see also Long, 1997).

8.7.3 Recasts as implicit feedback

It has been argued that the data provide evidence for the claim that interactional modifications draw learners to notice gaps in their interlanguage grammar. However, recasts rather than negotiation sequences were the focus of the study. Arguably few of these recasts were truly the result of communication difficulties. The use of recasts was not considered a weakness, to the extent that the recasts provided the learner with implicit corrective feedback as negotiation sequences do (Long & Robinson, 1998) and were provided as confirmation requests, signalling potential communciation difficulties. Further research on on-line noticing in the context of oral interaction, which includes investigation of negotiation sequences, is desirable.

8.7.4 Learner factors

Two learner factors of probable relevance to noticing are language aptitude and individual phonological short-term memory (STM). First, language aptitude as measured by the Modern Language Aptitude Test, has been shown to be a good predictor of second language learning (Carroll, 1981; De Graff, 1997; Ellis, 1994a) and to be related to both explicit and implicit learning and awareness (Robinson, 1995). Secondly, there is evidence that phonological STM constrains vocabulary acquisition and may play a role in morphosyntactic acquisition (for review see N. Ellis, 1997). Given that individuals differ in their phonological STM capacity (N. Ellis, 1997), a pre-test of phonological STM in the learner's first language and of language aptitude would allow a comparison of individuals on this basis in addition to developmental level alone.

8.7.5 Oral production as a measure of IL development

While output was used as a measure of the effects of noticing (i.e., intake), this is clearly only one part of the story. A measure of language knowledge, such as the use of a grammaticality judgment test could also be used to test effects of noticing. Lightbown and Spada (in press), for example, found differential effects in post-test performance on written and oral tests of question structures. In their study, learners performed at higher stages of question development in written tasks than on oral production tasks. They make the point, however, that the model of question development as proposed by Pienemann, Johnston and Brindley (1988) was based on oral interview data not written data and, therefore, in assessing development, oral tests were a more appropriate measure (see also Pienemann, 1989).

8.7.6 Other areas of research

This investigation focused on question forms and learners' noticing of morphosyntactic changes in recasts. Of further interest would be learners' noticing of lexical and phonological items in the input as a result of interactional modifications (see Mackey & Gass, 1998).

Another avenue for research lies in the connection between output and noticing. Within the context of the classroom a number of researchers have suggested that recasts are less effective as a form of corrective feedback to the learner because they do not lead to self-repair and thus do not push learners in their output (Allwright & Bailey, 1991; Chaudron, 1988; Calvé, 1992; Lyster, 1998a; 1998b; van Lier, 1988). Yet these concerns leave out the processes of noticing, comparison and integration. Other researchers have debated the relationship between feedback and immediate output and its effect on interlanguage change (Schachter, 1983; Gass, 1988; Gass & Varonis, 1994). An important theoretical question is "does production *per se* make learners more attentive to the feedback they receive (Swain, 1995; Swain & Lapkin, 1995; see also Ellis et al., 1994; Mackey, 1995; Pica, 1992a on the issue of

participation)?" Such a question might be explored through a combination of the use of retrospective and on-line measurement of noticing in oral interaction.

Other important questions relate to the level of the learner: "How is feedback on forms beyond the level of the learner used, if at all?"; "Does feedback on learners' use of formulas push learners to begin to analyse language previously processed as chunks?" These questions require careful detailed analysis of interlanguage development in longitudinal data.

While future research questions are myriad, this study represents a first step in examining learners' perception and use of implicit feedback within oral interaction. Future research may provide a clearer picture of the interface between interaction, noticing and second language development.

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APPENDICES

APPENDIX 4.1 Subject biodata

Table A4.1 Subject biodata

Group	ID	sex	L1	arrival	education	future plans	pre-test Stage	post-3 Stage	correct recall M
HIGH	A1	F	Korean	6 mths	univ. grad	Teach English in HC	5/6	5/6	51.35
	A12	F	Korean	3 mths	univ.	return to HC	5	5	84.85
	B2	M	Korean	3 wks	univ. grad	TAFE 3 years	5	5	58.18
	C1	M	Thai	3 yrs	univ.	TAFE / univ.	5/6	5/6	81.82
	D22	M	Korean	3 wks	univ.	return to HC	5	5	69.14
	E2	M	Korean	5 wks	univ.	return to HC	5/6	5/6	81.82
	F12	M	Korean	2 wks	univ.	return to HC	5	5	67.44
	G2	F	Korean	1 wk	univ.	return to HC	5	5	68.85
	H12	F	Indonesian	3 mths	univ.	univ. degree acquaculture	5/6	5/6	84.21
	I1	F	Japanese	1 wk	univ.	1 yr	5/6	5/6	91.89
	J12	M	Korean	2 wks	univ.	postgrad architecture 2 yrs	5	5	71.88
	K1	F	Thai	1 mth	univ.	2 yrs seafood industry	5/6	5/6	70.49
	L1	F	Thai	1yr	univ.	postgrad	5	5	76.92
	M22	F	Japanese	3 mths	secondary	unknown	5	5	92.31
	N1	F	Korean	6 mths	univ.	unknown	5	5	61.54

KEY:
HIGH = High group INTER = Intermediate group LOW = Low group M = male F = female HC = home country
univ. = has completed some undergraduate studies at university
secondary = graduated from high school
univ. grad = has completed an undergraduate degree at university
TAFE = Institute of Technical and Further Education (Australia)

Table A4.1 Subject biodata (CONT)

Group	ID	sex	L1	arrival	education	future plans	pre-test Stage	post-3 Stage	correct recall M
INTER	A32	F	Japanese	2 wks	secondary	return to HC	4	5	77.27
	B2	M	Russian	8 mths	secondary	unknown	4	5	69.81
	C2	M	Korean	6 mths	univ.	4 mths	4	4	62.26
	D2	M	Korean	1 wk	univ. grad	postgrad optometry 5 yrs	4	5	58.00
	E2	F	Mandarin	6 mths	univ.	TAFE graphic design / univ	4/5	5	81.36
	F3	M	Thai	2 wks	secondary	TAFE	4	4	75.00
	G2	M	Korean	1 wk	univ.	10 mths	4	5	76.92
	H2	F	Korean	3 mths	univ.	return to HC	4/5	5	62.26
	I42	M	Japanese	2 wks	secondary	return to HC	4	5	77.78
	J22	M	Japanese	6 wks	secondary	unknown	4/5	5	78.85
	K32	F	Japanese	1 wk	secondary	return to HC	4/5	5	85.71
LOW	A3	F	Korean	3 mths	secondary	unknown	3	4	57.14
	B2	F	Korean	2 wks	secondary	study hotel management HC	3/4	4	49.28
	C42	M	Japanese	3 wks	secondary	return to HC	3/4	4	75.44
	D3	M	Korean	2 mths	secondary	unknown	2/3	3/4	52.63
	E42	F	Japanese	1 wk	secondary	return to HC	2	3	62.50
	F42	F	Japanese	1 wk	secondary	return to HC	2/3	4	72.41
	G4	M	Japanese	1 wk	secondary	return to HC	3/4	4	55.32

KEY:
HIGH = High group INTER = Intermediate group LOW = Low group M = male F = female HC= Home country
univ = has completed some undergraduate studies at university secondary = graduated from high school
univ. grad = has completed an undergraduate degree at university TAFE = Institute of Technical and Further Education (Australia)

Appendix 4.2 Examples of pre-test performance

Samples of data from two learners for each group are given below, together with a description of general pre-test performance in each group.
The tasks used for the pre-test were the same for all groups: a spot-the-difference task (Park scene) and a story-completion task (Dinner party).

A4.2.1 Low group

General description:

- Relies on facilitator to provide vocabulary and main scaffold of story.
- Often asks unrelated questions, many topic shifts.
- Apparent inability/frustration to ask what they want to ask.
- Produces questions at Stage 2 and 3. Stage 4 and 5 questions are formulaic.

A4.2.2 Intermediate group

General description

- Learners in this group are generally able to ask the questions they want to ask but questions are often nonTL and require some work on the part of the facilitator to interpret.
- Able to produce Stage 3 and Stage 4 questions without difficulty
- Some Stage 5 questions are produced but these are generally either common structures such as "what does he do?" or non-TL.

A4.2.3 High Level Group

General description

- Confident, able to pursue topic, can ask all kinds of questions.
- Stage 5 questions are produced without difficulty. Stage 6 questions may be produced.

LOW LEARNER 1 : T=NNS J=NS

T your picture : how many birds?

T my picture is (. .) chair (. .) three people chair?
J hmm huh
T your picture (. . .) three persons?

T your picture : have book?

T your picture (.) what color?

T you picture is tree side : tree side : tree side?

T does she XX : does she : what does she do?

T what is cook?

T who is birthday?

T how old is he?

T this party : how many people?

T do they = ah = do they have : children?
J this is their son
T son?

T what does he do?

T what times start party?

T what does she do?

T what : kind of soup (. .) what = what kind of ?

T how long : hmm (. .) meat in ov = oven?

LOW LEARNER 2: G=NNS J=NS

G how= oh (..) oh is is she good cook?
J yes shes a good cook yes
G ask
J mm
G how= mm how do= what do you do?
J um shes making a big dinner
G mm
J its a very special dinner (..) for a birthday
G show showpan showpan saucepan?
J saucepan yep
G saucepan in?
J oh in the saucepan there is some potatoe and this is meat a big piece of meat (..) I know what the dinner is for its a special dinner
G um he (.) is is he interesting?
J yeah shes interested yep shes very happy shes making dinner for her husbands birthday
G mm (.) oh he he what do you do?
J hes setting the table hes preparing for the party

G how many ah how many guest how many the guest?

G (..) what do you do for living? [*one contour]*
J mm?
G he is what do you do for living? he
J him?
G yes
J he is her son
G what do you do for a living? your job job

INTERMEDIATE LEARNER 1 : JD=NNS J=NS

JD is one pers= ah one woman playing ball?

JD ah one cou= one couple is wearing ah what ah they is doing?

JD um (...) are there are there bird-e in your picture?

JD one child= one children one children drink ah water pic= how about your ah
J ah there is a child
JD ya
J but he is not drinking water
JD drink what?

JD ah can can you tell me this what material?
J um its a carrot
JD carrot? do you think ah when ah in the days when?

JD mm (.) for what she i:s ah cooking?
J she is cooking for a special dinner
JD special dinner?
J its somebody's birthday
JD somebody's birthday? ya (.) ah she: how many how many how many people she ah get? getting? ah have? she get= she have?
J um she'll have 8
JD =oh she have=
J =8 people to dinner
JD 8 (.) people (.) for dinner (..) ah birthday for for birthday?
J yeah her husband's birthday
JD ah husbands birthday ya (...) ah ya other other other family ah i: is are other family what are you doing? ah what what what it is what it is what what what ya (.) ya other other family

JD ya what are doing now?
J oh hes setting the table

JD how many how many mm did she invited invited invited people?
J oh she invited 7 people

INTERMEDIATE LEARNER 2 : K=NNS

K ah who is talking each other?

K how = how many family : ah in the park : ah sitting in the chair?

K who is drinking = who is drinking ah in family = in family?

K ah yes (. .) ahh how many people playing are in the XX XX? what what is ?

K is this woman or : man?

K [humming] hmm (. . . . .)ah how many people are there in the park?

K what = what is she cooking?

K what what what is she cutting?

K ah ah [laughing] I = I = I don't know what what should I ask?

K how how long =how long : it takes : ah how = how = hh= how long it takes ah : dinner?

K is she's wife?

K [laughing] is is she = is she married?

K 'kay (. . .) is she : finished cooking?

K ah what kind of food ah : is she cooking? ah : meat and ?

K ah (. . .) why are they ah open mouth?

K what = why are the ah meat is gone?

K who took it the meat?

HIGH LEARNER 1 : N=NNS J=NS

N oh are there 5 5 colourful birds in your picture?
J ah yes there are 5 colourful birds
N 5 colourful birds mm are there red flowers in your picture?
J yes one row of red flowers
N how many children are playing in your children?

N do you have seabirds in your picture?

N mm are there (..) mm how many are eating lunch or something in your picture? they are sitting on a bench

N oh picnic box (..) mm is one girl is a girl (.) is drinking in your pict= drinking water in your picture?

N mm (.) how many couples do you have in your picture I mean besides a family?

N what will she cooking?
J oh shes cooking a very special dinner
N so is it mm is it special day for her?
J for her husband
N for her husband oh is it ah her husband birthday?
J thats right
N oh what is he doing now?

N ah had had she had she got any present for him?

N for her mm (.) what time will he go back to hou= the house
J oh about 6:00

N is he her husband?
J no thats her son
N yeah I I thought so because hes much younger than she
J [laughs] thats right
N what does she= does= what does he do?
J um hes at university

N and (.) has he got any present for him?

N oh is he putting lamb into the oven? lamb? meat?

HIGH LEARNER 2 : G=NNS J=NS

G has they got it 2 2 trees?
J yeah I've got 2 palm trees
G yeah and they got a what slop what they call this? the BBQ area?

G oh thats I have= oh maybe I have difference then mm the have someone in the monkey bar? you gots monkey bar in your thi= picture?

G just ask you oh right who's this lady in here?

G so what party about?
J um its a special dinner party for his birthday
G oh right so this um have they got children or?
J ah they've got one son
G one son so where is he now?
J hes at home
G oh so hes ready to celebrate ah his father birthday
J yeah
G oh right so how old is he? this one

G oh right so what what is she making I mean what is she cooking?

G oh I've got one thing where where do they come from anyway?

G oh so how can they meets each other?

G oh so th= is she finish her cooking or?
J well shes just come to check that everything is ok
G so why why why is she smiling for what is she smiling for?

Appendix 4.3 Examples of tasks

Examples of transcripts appear in Appendix 4.4.
Illustrations of Tasks 1 and 2 follow.

1. Story completion task. The Rescue (see Appendix 4.4.1)

1. Six year old Suen is in trouble. Her mother is very angry with her. She ate the [New Year] cake from the cupboard. Now her mother has to go and buy another cake. As punishment, Suen is told to stay home by herself. She is not allowed to play with her friends or go shopping with her mother.
2. Suen lives on the 14th floor of an apartment building. She is really mad. She wants to play with her friends. She has a plan...
3. She decides to escape through the window. She plans to walk along the ledge to the next flat...
4. Once on the ledge Suen realises how high up she is. She can't move. She is terrified. Luckily she is seen by neighbours from the floor below. They ring for help.
5. The firemen come and rescue Suen. One man tries to pull her in but Suen is afraid, she doesn't know this stranger.
6. The man pulls Suen to safety. Her mother comes home to find Suen and the firemen. Suen is in trouble again! This time she is sent to bed.

2. Picture drawing task. Farm scene (see Appendix 4.4.1)

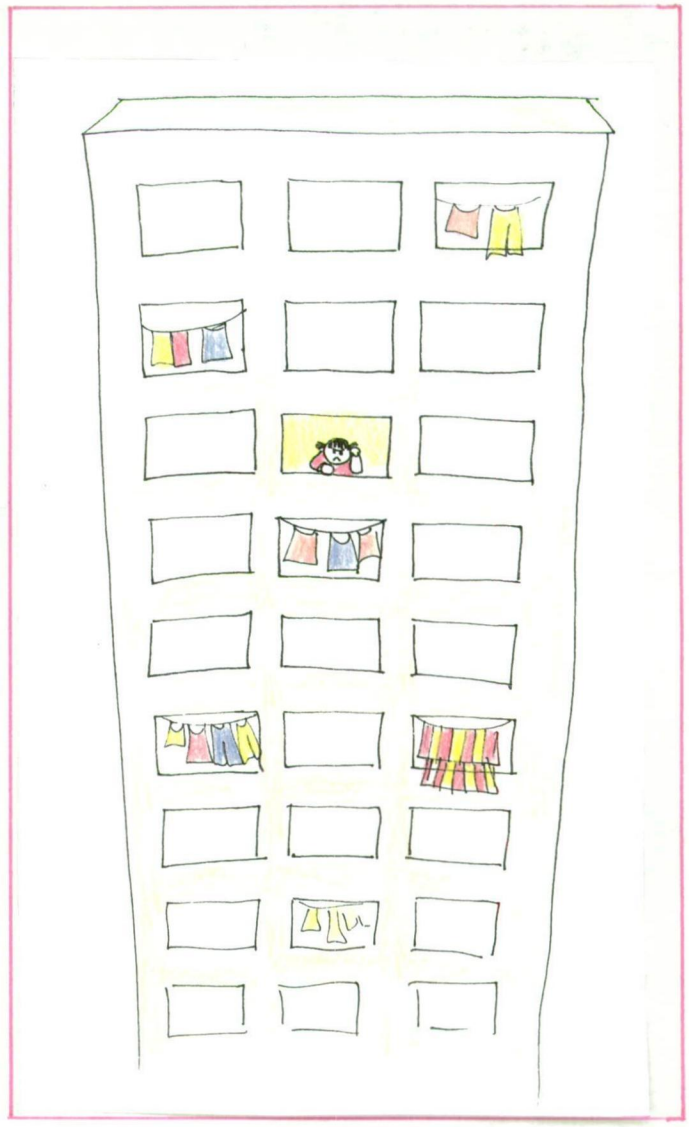
3. Story completion task. Baby name story (see Appendix 4.4.2)

1. This man is a clerk, his name is Andrew, the woman is a colleague. The woman is working hard but Andrew is thinking about something else... he is waiting for a telephone call...
2. Suddenly the phone rings. He rushes to answer it...
3. He drops the phone and runs out of the room. His colleague is astonished.
4. Andrew goes to the hospital
5. His wife has just had a baby. They are very happy. Its a baby boy.
6. The man leaves the hospital disappointed. He had a list of names for the baby, he wanted to call the baby Andrew but his wife has chosen the name Tom.

4. Picture drawing task : Objects (see Appendix 4.4.2)
(task adapted from LARC task, see Mackey, 1994a)

The Rescue (Story completion task)

a.

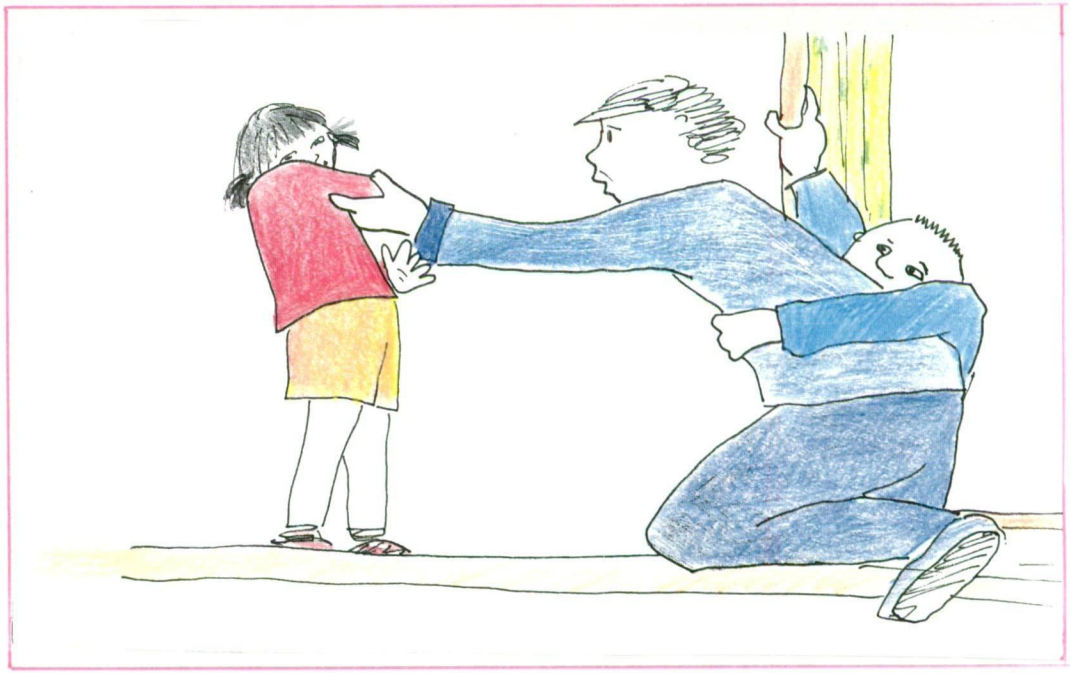


b.

The Rescue (Story completion task)

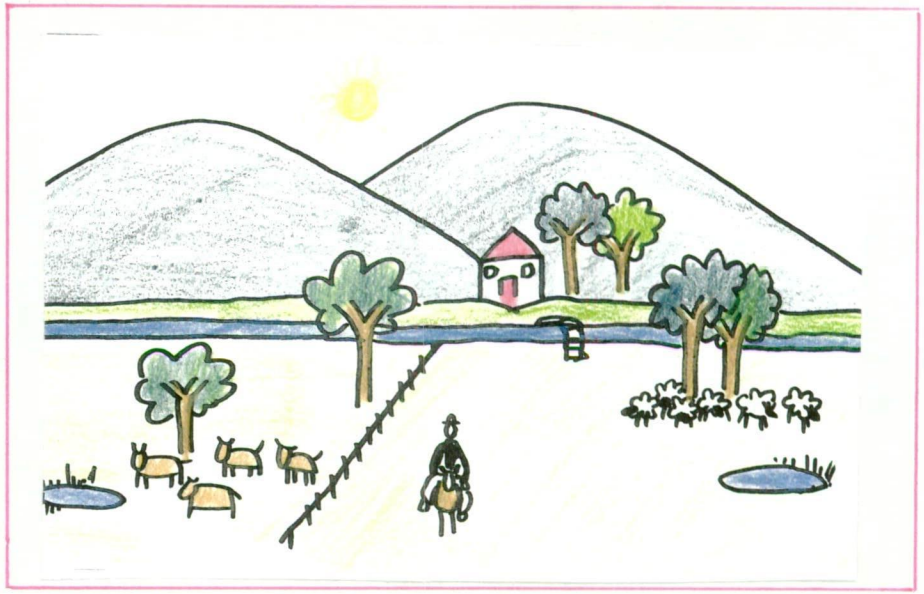
d.

c.

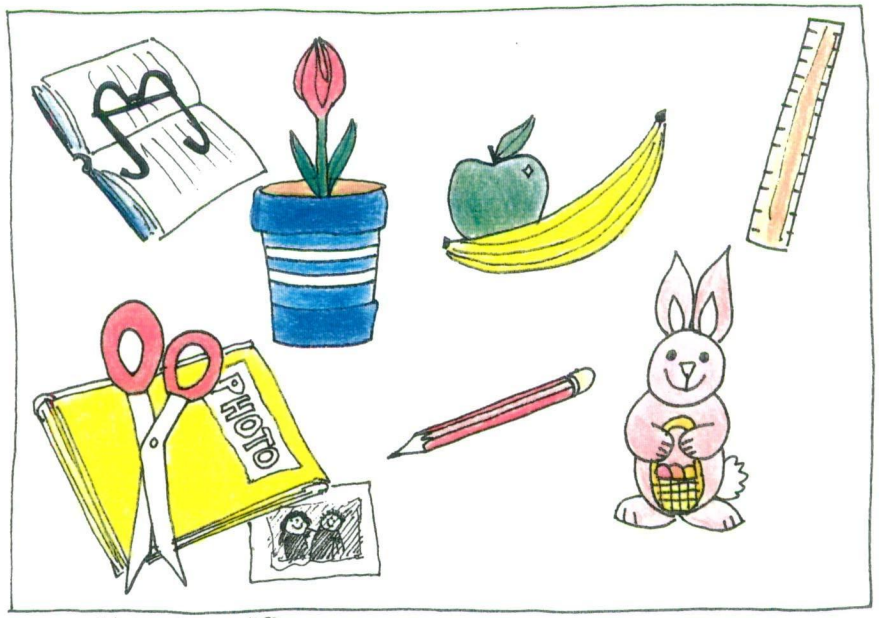


e.

Farm scene (Picture drawing task)



Objects (drawing task)



Assorted objects - Picture differences

Appendix 4.4 Sample treatment transcripts

Sample transcripts from two treatment sessions from two learners are given here (see pp. 261 - 264 for illustrations of tasks).

4.4.1 Learner 1 Sample of treatment data

Treatment 4 A M2/J 11 Mar 1996 NS = J NNS = M
Story completion = Rescue / Picture drawing = farm
only questions, recasts and recall episodes are transcribed

M what what does the= what does she doing?
J what's she doing?
M yeah **what is she doing?

M what's wrong of her? what's wrong happened of mm no what's wrong what's happen of her?
J what happened to her?
M yeah ** what happened to her?

M um how many cakes have she eat?
J how many cakes did she eat?
M ** how many cakes did she eat?

M so how how did her mother going to do after she eat eats the cake?

M how she live in flat? =appartment=
J =yeah she lives in flats
M oh flats ** she lives in flat

M what did she do= why why does she watch the window= look look outside?

M she is decide how to go how to go going to outside [laughs]

M oh but she's living very high
J yeah she lives very high up
M she's ** high up she lives very high up

M what will she want to do?

M now her neighbours is watch= look at her look at her and she is very afraid
J yes that's right her neighbours are watching her
M uh huh watching her ** the neighbours is watching her

M how how what level do you= are you= she=no what level (.) is she live?
J what level is she living on?
M ah yeah ** what liv= what level is she living on?

M how shall we do now?

M will they mm did they mm are they will tell her mother about this one? this?
J are they going to tell her mother? yeah yep

M she's mother angry too
J yeah her mother is very angry
M ** her mother is very angry yeah

[*instructions for new task*]

M ah how many farm do you= is there have?
J how many farms are there?
M ** how many farms are there?

M how many mountain are there?

M are there have a are there have a sun?
J is there a sun?
M is there a sun? ** is there a sun?

M how many people are they have?
J how many people are there?
M ** how many people are there?

M oh what= whi= where where where is he standing now?

M in the farm how many animals are there?

M have some rock? stone?

M and have a= what doe= close to that one= like this?

M in where where where the other dam is?
J where's the other dam?
M mm ** where the other dam?

M how draw that?

M are there= um are there have house?
J is there a house?
M mm ** is there house?

M um have there (.) are there have bird in the sky?
J are there any birds?
M ** are there any bird in the sky?

M one tree is it in the circle with the cow?

M oh have a river?

M river is this around here? between the house and the field?

M have there have ah are there have bridge?
J is there a bridge?
M ** is there a bridge?

4.4.2 *Learner 2 Sample of treatment data*

Treat 1 E S2/J 5 Mar 96 NS = J NNS = S
Story completion = baby name Picture drawing = objects
only questions, recasts and recall episodes are transcribed

S is it computer?

S why why do you see another person?

S maybe he think something what do you think?
J what's he thinking?
S =what does oh yeah what does he thinking ** what does he thinking?

S what's wrong the telephone?
J what's wrong with the telephone?

S yeah ** what's wrong with the telephone?

S what what does he doing?
J what's she doing?
S **whats doing?

S they are teacher?

S he look like um Eastern Eastern people?

S why is surprised? why why does he surprised?

S where is where is a Western people?

S who who is he who does he expecting now?
J who's he expecting
S ya *who's expecting?

S he is married? he get married?

S how many kids do= does he have?

S where does he go?
J where did he go?
S where did he go? ** where did he go?

S what what kind of big hurry?

S what's the building?

S that's the guy?

S why did he go ah went ah come to here?

S why his wife in the hospital?
J why is his wife in the hospital?
S **why he's in the ah why his wife in the hospital?

S then she ah they had already have baby?
J has she already had a baby?
S ya ** she alr= she already she already had the baby?

S theyre= is it daughter or son?

S what's his name?

S how about he ah his is his son have a a brown or yellow hair?
J does his son have brown hair or?
S brown hair or[laughs] ** does does his son has brown hair?

S he look like sad why?
J yeah he looks sad
S yeah he ** looks sad

S this is divorce document or why?

S yeah so why sad? I don't understand?
J why is he sad?
S yeah why is I sad why he sad? ** why does he sad?

S so he wants to exchange but his wife don't like?
J that's right his wife doesn't like the name
S oh he** oh I couldn't heard his wife his wife next

[*instructions for new task*]

S is there flowers?

S how many flowers do you have?

S is it important?

S is there table?

S do you have chair?

S do you have paper?

S where is where where is the newspaper?

S do you have a computer?

S do you have ah no desk do you have a pen?

S where is a book?

S do you have um uhuh do you have (.) card?

S where is the envelope?

S where is another envelope?

S then do you have stamps?

S where is another pen?
J where's the other pen?
S yeah the other pen ** where's the other pen?

S what do we say?

S what did you what do you have ah anything else?

S where is an apple? where is that apple?

S where is a pear?

S um do you have another fruit?

S do you have a knife?

S where is the scissors?

S you have just one newspaper right?

S do you have anything else?

S where is a ruler?

S rabbit do you have rabbit?

S where is rabbit?

S what is what is he holding?

S do you have anything else?

Appendix 4.5 Questionnaire to students

The following questionnaire was given to students immediately after the final post-test session and completed before they returned to class. Questionnaires were first translated into the L1 of the student and students were asked to respond in their L1. Answers were subsequently translated by native speakers. (Note that more space was given for students to write their answers on the translated questionnaires).

What did you think? name:

Please fill out the questionnaire below. Use your first language (not English).

1. How did you feel during the conversation practice?
2. Did you like doing the activities?

   Why? /Why not?
3. Which activities in particular did you like / didn't you like? Why/Why not?
4. Do you feel that you learnt anything by doing the activities?

   What?
5. Did you notice any particular language that you used a lot?
6. Did you find anything particularly helpful?
7. What do you think this project is about? How do you know?
8. In the sessions, we used the signal "knock knock". Why did we do this?

   When did we knock?
9. How useful did you find the conversation practice? (please circle)

very useful	useful	OK	not very useful	a waste of time

10. Do you have any comments or suggestions?

Appendix 4.6 Transcription Conventions

Table A4.6.1 Transcription conventions

Description	Code	Example
1. PAUSE hesitation, brief pauses	colon	oh so: is he : waiting for : telephone : from : somebody?
2. LONG PAUSE periods indicate length of pause	(.)	what think (.) ah is he? is he ah (...) not ah she is she is er (..) baby she
3. INTERRUPTION Speaker interrupts herself, or changes in mid sentence.	=	mm ah he jus= he he he looks good
When a second speaker interrupts the first speaker, the equal sign is typed at the beginning of the second speaker's utterance.	=	NS so NNS =where where does where did bag changed? changed?
4. SPEAKING AT THE SAME TIME Two speakers are talking at the same time, words are typed between equal signs	=word =	NS ask =ask me= NNS =what is= he doing?
5. UNCLEAR A double cross is typed for each indecipherable word.	XX	JD ah what i= this= is this ah (.) ah ca hat is this hat ah ah XX for? mm no
6. UNCLEAR /BEST GUESS Word / phrase is unclear but decipherable	[word]	NNS what [does] he doing?
7. COMMENTS Laughter, noises or comments on transcript	[ ]	NNS yeah he is coming [laughs]

Table A4.6.2 Transcription hours

	Transcripts	Full Transcription	Partial Transcription
	N	Hours	Hours
Treatment sessions	165	4	51
		(20 hrs)	(102 hrs)
Test sessions	168	24	32
		(120 hrs)	(64 hrs)
TOTAL	433	28	83
		(140 hrs)	(166 hours)

Note: Hours spent on transcription given in brackets.

Appendix 4.7 Coding sheets used for treatment sessions

DC2 CODING SHEET TREATMENTS **SUBJECT:** **Coder:** **E =**

TYPE OF DIFFERENCE		E1	E2	E3	E4	E5	E6	E7	E8	E9	E 10	E 11	E 12	E 13	E 14	E 15	E 16	E 17	E 18	E 19	E 20	E 21	E 22	tot al
SUBSTITUTION	1																							
INVERSION	2																							
FRONTING	3																							
INSERTION	4																							
FRAGMENT	5																							
MORPHOLOGY	6																							
UNRELATED	7																							
recall √ √• ~ X• X (correct) (modified) (fail)	√																							
trigger Qform	4a																							
recast Qform	4a																							
recall Qform	4a																							
CHANGES	1 2≥ 3																							
MPH COUNT	≤5 ≥6																							
Comments																								

Table A4.7.1 Summary of types of changes to trigger utterance in recast

Type	Description	Examples
SUBSTITUTION	the aux verb changes, the Q form remains the same	NNS Is it his wife have some problem? NS does his wife have some problem?
		NNS what does she wear? NS wha t is she wearing?
INVERSION	the recast provides a higher level structure (Q4) through inversion.	NNS why he is very unhappy? NS why is he very unhappy?
FRONTING	(Q2 to Q3) a question word or aux is placed at the front of SVO	NNS he go to he go to hospital isnt it? NS did he go to the hospital?
INSERTION	Q form changes though adding an argument internally eg subject, aux [and required morphology]	NNS what doctor say? NS what is the doctor saying?
		NNS what what they do : now? NS what are they doing?
		NNS what does brief= what does mean? NS what does briefcase mean?
FRAGMENT	a full question form is provided following a fragment / single word trigger utterance	NNS any tree? NS are there any trees?
MORPHOLOGY	the morphology on the aux or main verb changes, the Q form remains the same	NNS why is she cry? NS why is she crying?
		NNS how many children does she has? NS how many children does she have?
NONRELATED	the Q form remains the same, changes are irrelevant in terms of the question form itself eg change of pronoun, addition of article, lexis, pronunciation	NNS is it narcot drug contract? NS is it a drug contract?
		NNS is he alone in the classroom? NS is she alone?

Table A4.7.2 Coding for subsets of stages for question formation in ESL development

CODE	Description	Example
F	formula utterance / fragment (incomplete syntax)	What do you do your picture? Why? What happened?
2	SVO?	Your cat is purple? You have cat?
3a	IL form - DO/WH front	Is she has a dog? Why he is very unhappy? Does he has a dog?
3b	TL form - analysed DO	Does she wear a shoe? Does he want to paint?
4a	Aux + SU +	Is she good cook? Is she happy? Are there dogs your picture?
4b	Q + aux +	What is there? What time is it? [where is go??]
4c	Q + aux + SU +	Why is she angry? Why is he hurry up? Where is he going?
4d	other	Whats wrong with that window? How long is he married? Is she carrying anything?
5a	Wh/ DO2nd	Where does your cat sit? What do you do? Why does she cry?
5b	IL form- Wh/ Do-AUX2nd (Use of do instead of aux / overuse or underuse of gerund)	Why do she cry? Why is she cry? Why is he stay on the front? ? What does she doing? What will she going to do in cooking
5c	Wh/AUX2nd + gerund	Why is she cooking? Where is she bringing it?

Appendix 7.1 Comparison of Q4 forms: auxiliary initial versus auxiliary medial

SPSS Results of t-test for paired samples

Table A7.1 presents the results of a *t*-test for paired samples performed on data of all subjects. This compared accuracy of recall of recasts containing Q4 forms in which the auxiliary was initial (e.g., *"is there a bear?"*) with those in which the auxiliary was medial (e.g., *"what is there?"*).

It should be noted that *t*- tests were also performed on data from individual groups. For each group, accuracy of recall of the two different types of Q4 forms in recasts were also found to be non-significant.

Table A7.1 Correct recall on recasts containing Q4 forms. Comparison of auxiliary initial and auxiliary final forms. (All groups)

Variable	M	SD	SE of Mean
Aux initial	74.4119	20.554	3.578
Aux final	77.7498	10.382	1.807

Paired Differences 95% CI (-10.381, 3.706)

M	SD	SE of Mean	t-value	df	2-tail SIG
-3.3379	19.864	3.458	-.97	32	.342